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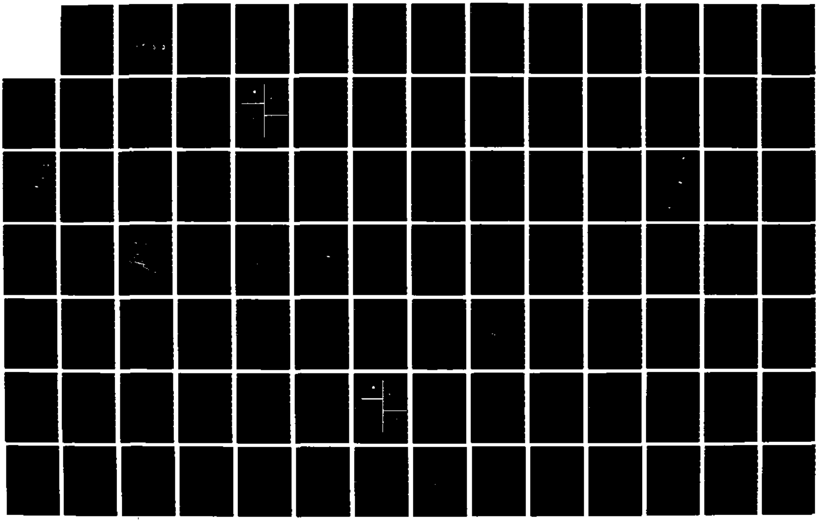

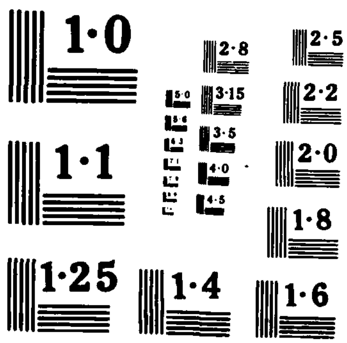
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INSTALLATION RESTORATION PROGRAM

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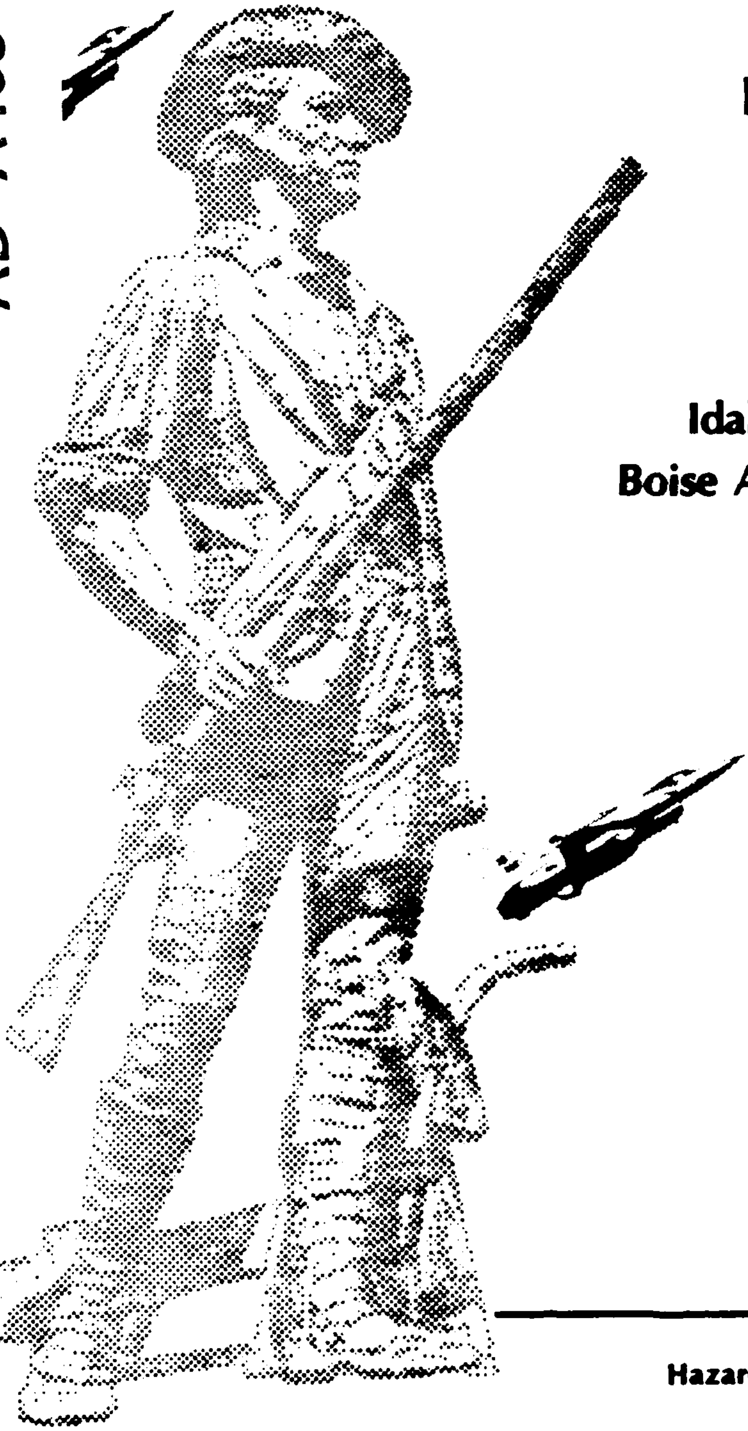

Records Search

Idaho Air National Guard
Boise Air Terminal (Gowen Field)

Boise, Idaho

Hazardous Materials Technical Center
February 1985

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INSTALLATION RESTORATION PROGRAM
RECORDS SEARCH

Prepared for

Idaho Air National Guard
Boise Air Terminal (Gowen Field)
Boise, Idaho

Prepared by

THE HAZARDOUS MATERIALS TECHNICAL CENTER
The Dynamac Building
11140 Rockville Pike
Rockville, Maryland 20852

February 1985

Contract No. DLA900-82-C-4426

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EXECUTIVE SUMMARY

A. Introduction

1. The Hazardous Materials Technical Center (HMTC) was retained on September 6, 1984, to conduct the Gowen Field Air National Guard (ANG) Base Records Search under Contract No. DLA900-82-C-4426, with funds provided by the ANG.

2. Department of Defense (DOD) policy, directed by Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, is to identify and fully evaluate any potential problems associated with past hazardous material disposal procedures on DOD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health and welfare that may have resulted from these past operations.

3. To implement the DOD policy, a four-phase Installation Restoration Program (IRP) has been directed. Phase I, the Records Search, is the identification of potential problems. Phase II (not part of this contract) consists of follow-on field work to determine the extent and magnitude of contaminant migration. Phase III (not part of this contract) consists of development of any required new technology to abate unique contamination problems. Phase IV (not part of this contract) includes those efforts to evaluate alternatives for remedial actions and any efforts required to control identified hazardous conditions.

4. The Gowen Field ANG Base Records Search included a detailed review of pertinent installation records, contacts with six government organizations for documents relevant to the Records Search effort, and an onsite base visit conducted by HMTC during September 17-21, 1984. Activities conducted during the onsite base visit included

interviews with 19 past and present base employees, ground tours of base facilities at Gowen Field, a detailed search of base records, and meetings with personnel from several Idaho State agencies in Boise, Idaho.

B. Major Findings

1. The major industrial operations of Gowen Field that have produced hazardous wastes include Aircraft Maintenance and Nondestructive Inspection, Ground Vehicle Maintenance, Fuels Management, Tracked Vehicle Maintenance, Helicopter Maintenance, Corrosion Control, and Photo Processing. These operations generate varying quantities of waste oils, recovered fuels, and spent solvents and cleaners.

2. Various mechanisms for disposal of the waste materials generated by these shops have existed in the past. These include disposal via the Defense Property Disposal Office (DPDO) or private contractors, burial in off-base landfills, burning at the various Fire Department training areas, and discharge onto the ground. Since 1980, the majority of the hydrocarbon wastes have been disposed of via DPDO and private contractors, or in the Fire Department training area.

3. Interviews with 19 previous and present base employees and a field survey resulted in the identification of 13 past disposal and/or spill sites at Gowen Field. Of these 13 sites, 6 have been further evaluated using the Air Force's Hazard Assessment Rating Methodology (HARM). The other 7 sites were not evaluated using the HARM system because it is thought that they exhibited no potential for contaminant migration and; therefore, pose no significant hazards to health and welfare. The following table presents a priority listing of the six evaluated waste disposal and spill sites and their associated hazard assessment scores.

Priority	Site No.	Site Description	Subscores: Receptors	Subscores: Waste Characteristics	Subscores: Pathway	Subscores: Waste Mgmt. Practices	Overall Score
1	1	Current Fire Dept. Training Area	52	100	67	0.95	69
2	2	Former Fire Dept. Training Area	52	100	52	0.95	56
3	3	Central Drainage Ditch	52	48	67	1.00	56
4	4	Oil Patch in Drainage Field	50	40	67	1.00	52
5	5	Former Fence Post Preserving Operation	50	40	49	1.00	46
6	6	Tar Pit	50	30	49	1.00	43

C. Conclusions

1. Information obtained through interviews with 19 past and present base personnel, review of base records, and field observations indicate that small quantities of hazardous wastes have been spilled or disposed of on Gowen Field property.

2. No evidence of off-base environmental stress was observed, resulting from either past waste disposal practices or waste spillage at Gowen Field. Minor on-base environmental stress in the form of discolored soil and stunted vegetation was observed at sites 4 and 5.

3. No direct or indirect evidence of groundwater contamination was discovered. However, the overall groundwater environment at Gowen Field is susceptible to contamination from surface contaminants. Factors contributing to this susceptibility are the presence of fractures within the hardpan which allow downward migration of fluids, although, at a slower rate than would otherwise occur if the hardpan were not present.

sediments, the lack of impermeable confining layers, and the pronounced influence of percolating surface water on water levels in the shallow aquifer.

4. No evidence of off-base environmental stress resulting from past disposal of waste materials was observed in the immediate vicinity of Gowen Field. However, the close proximity of all sites to the base boundaries increases the likelihood of off-base contaminant migration via the groundwater pathway. Fortunately, the direction of groundwater flow is to the south of the base toward the open desert and away from populated portions of the Greater Boise area.

D. Recommendations

The potential for contaminant migration at Gowen Field is high; therefore, it is recommended that Phase II monitoring be conducted. This monitoring should consist of analysis of soil and groundwater samples for selected organic and inorganic parameters. The primary purposes for monitoring each of the proposed locations are to:

- Determine the depth within the unsaturated zone to which contaminants have migrated. If only the shallow subsurface has been contaminated at a particular site, it may be possible to remedy the problem by excavating the contaminated material.
- Determine whether groundwater at each monitoring site has been contaminated.
- Determine the extent of contamination and the rate and direction of contaminant migration, if groundwater contamination is observed.

All of the rated sites are recommended for monitoring. These sites have been grouped into monitoring areas on the basis of their proximity to each other. Figure ES-1 illustrates the three general areas at Gowen Field that are recommended for monitoring, and the locations of the spill/disposal sites within these areas. Two of the proposed monitoring areas encompass more than one spill/disposal site due to the close proximity of the sites. The first monitoring area encompasses the current and former Fire Department

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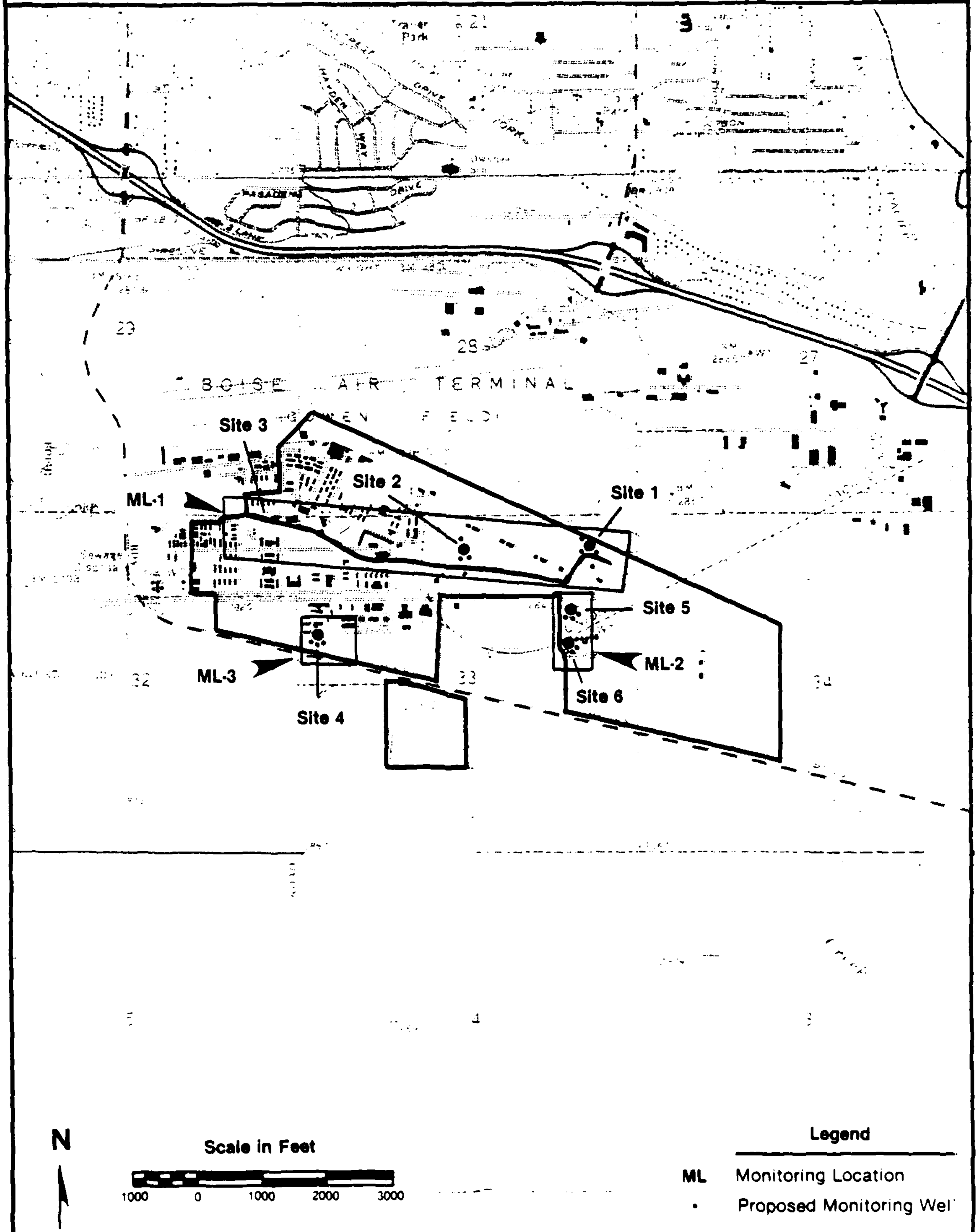
Figure ES-1.
Locations of the Proposed Areas at Gowen Field to be Investigated During Phase II of the IR Program.



Source: U.S.G.S.

training areas and the central drainage ditch (Sites No. 1, 2, and 3). The second monitoring area encompasses the former fence post preserving operation and the tar pit (Sites No. 5 and 6). The third monitoring area encompasses the oil patch in the drain field (Site No. 4). Table ES-1 summarizes the monitoring locations within which all of the above spill/disposal sites are located.

Enlargements of the proposed areas to be monitored at Gowen Field are illustrated in Figure ES-2. For monitoring locations 1 and 3, it is initially recommended that monitoring wells be installed at the approximate locations indicated in Figure ES-2. This arrangement assures that three wells are located down-gradient of the fire pits and one is up-gradient; only soil sampling is recommended for the central drainage ditch. Three down-gradient wells are recommended at each of the sites in monitoring location 2. The wells recommended for monitoring location 1 will serve as up-gradient wells for this site. For monitoring location 3, it is recommended that one up-gradient and three down-gradient wells initially be installed.

In addition to the recommendations for the spill/disposal sites which were rated by the HARM procedure, other miscellaneous recommendations are offered for various unrated sites and locations. The abandoned drum pile should be cleaned up. Soil monitoring should be done around the abandoned fuel tank. Initially, this monitoring should consist of analysis of five different subsurface soil samples for oil and grease, phenols, and priority organic pollutants. If the results of the first set of soil samples are positive, further soil sampling and analysis should be conducted to determine changes in contaminant concentration with depth in the soil. If necessary, the tank should be drained and removed.

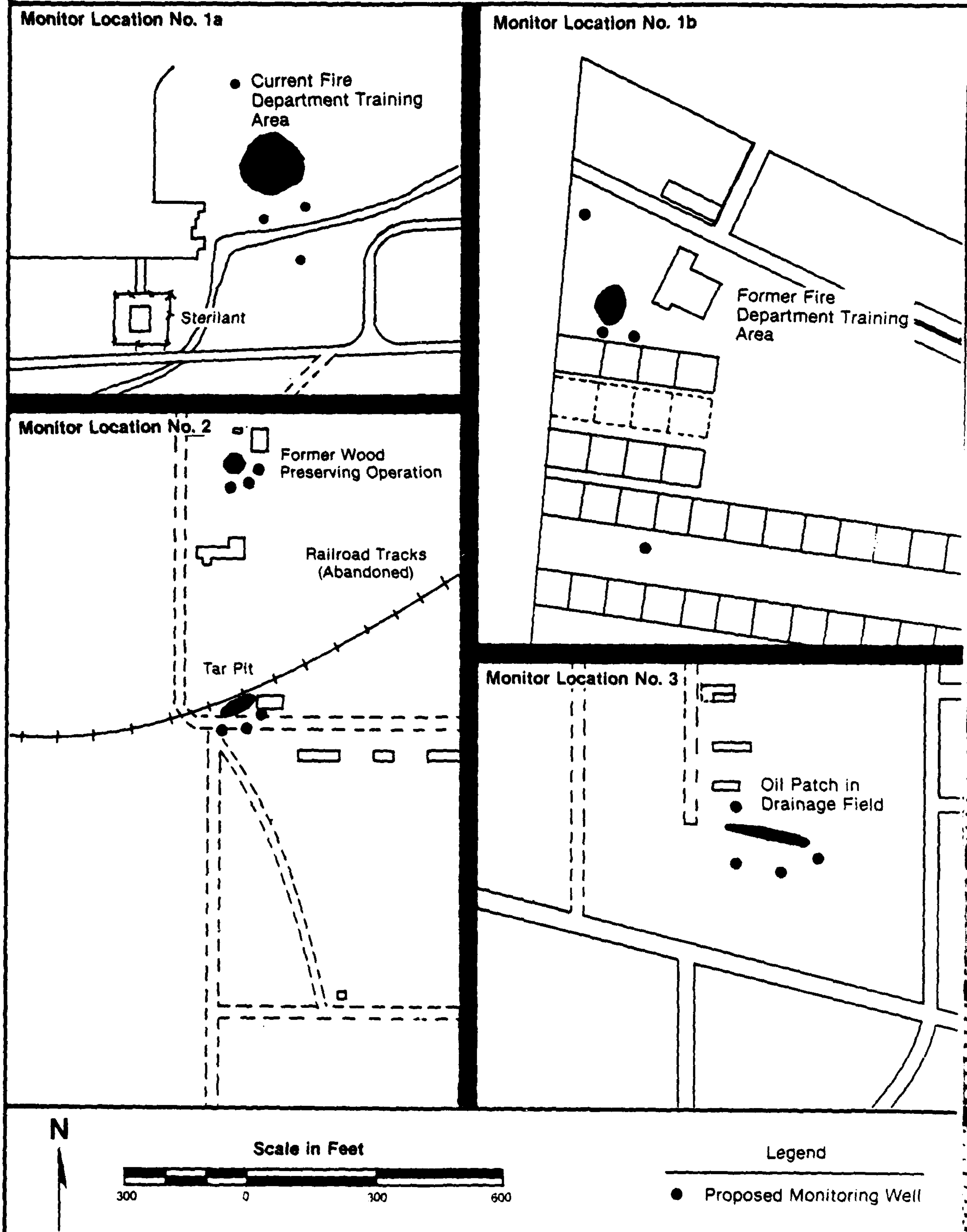
A single up-gradient well which is far removed from all known sources of contamination is recommended at the northwest boundary of Boise Air Terminal or Gowen Field. The purpose of this well is to provide reliable

Table ES-1.
Summary of the Spill/Disposal Sites Recommended for Phase II Investigation, and the Monitoring Location Within Which Each is Located.

Site	Description	Monitoring Location
Site 1	Current Fire Dept. Training Area	ML-1
Site 2	Former Fire Dept. Training Area	ML-1
Site 3	Central Drainage Ditch	ML-1
Site 4	Oil Patch in Drainage Field	ML-3
Site 5	Former Fence Post Preserving Operation	ML-2
Site 6	Tar Pit	ML-2

HMTC

Figure ES-2.
Locations of the Proposed Groundwater Monitoring Wells Within the Proposed Areas to be Investigated at Gowen Field.



and alternative background groundwater quality data in the event that the previously recommended up-gradient monitoring wells at the individual monitoring locations are impacted by unanticipated groundwater contamination up-gradient from them. Such interference with the up-gradient wells is unlikely, but is possible due to the historically high level of operational activity throughout the area of the monitoring locations.

All monitoring wells should be designed and constructed so that they facilitate:

- Determination of vertical variations in parameters such as aquifer permeability, pressure head, and contaminant concentrations. Whether such data are acquired using, for example, nested piezometers or fully screened wells fitted with packers is at the discretion of the IRP Phase II Contractor. Such information is important for determining the three-dimensional orientation and movement of the contaminant plume and for designing any required Phase IV Remedial Actions.

- At a minimum, the well construction protocol should include:

  - Tremie grouting of the annular space for each well to a depth of 5 feet below ground surface.

  - Recording of detailed well logs which include daily static water levels, type of geologic materials encountered, depths to water-producing zones, and samples of cuttings from each well that are collected from 5-foot intervals.

  - Proper identification and surveying of all wells.

Groundwater from each screened interval for all wells should be collected and analyzed for volatile organic carbon species, oil and grease, and total organic halogens. All groundwater quality data should be statistically analyzed by methods approved by the U.S. Environmental Protection Agency and Idaho Department of Water Resources in order to identify significant differences in groundwater quality.

I. INTRODUCTION

A. Background

The Idaho Air National Guard (ANG), headquartered at Gowen Field in Boise, Idaho, fulfills a vital defense role by maintaining the 124th Tactical Reconnaissance Group at a combat readiness level and by providing effective reconnaissance training for other ANG units. The Idaho ANG assumes the responsibility of Base Manager for the operation and maintenance of the airfield, personnel and facilities, and for the support of tenant units including the Idaho Army National Guard (ArNG) and the U.S. Marine Corps (USMC). Additionally, the Idaho National Guard is on call to the State in times of emergency. Full-time preparedness to discharge these responsibilities necessitates that the Idaho ANG be engaged in a variety of operations, some of which involve the use of toxic and hazardous materials.

In 1975, DOD began its Installation Restoration Program (IRP) to assess past activities on DOD installations related to storage and disposal of toxic and hazardous materials. DOD policy is to identify and fully evaluate suspected problems associated with sites of former hazardous materials disposal, and to control hazards to health and welfare that may have resulted from these past activities. to p. I-3

After the initiation of DOD's IRP, Congress created the Resource Conservation and Recovery Act (RCRA) of 1976 as the primary means for governing disposal of hazardous wastes. Under Sections 3012 and 6003 of this act, Federal agencies, such as DOD, are directed to assist the U.S. Environmental Protection Agency (EPA) and state agencies to inventory past disposal sites and to make the information available to the requesting agencies. Similarly, Congress created the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 to assess and alleviate potential adverse public health and environmental impacts resulting from past hazardous waste management practices. On August 14, 1981, in Executive Order 12316, the President delegated certain authority

specified in CERCLA to the Secretary of Defense. The current DOD IRP policy is contained in DEQPPM 81-5 dated 11 December 1981. DEQPPM 81-5 reissued and amplified all previous directives and memoranda regarding the IRP. The IRP is the basis for response action on Air Force installations under provisions of CERCLA, clarified by EO 12316. CERCLA is the primary legislation governing remedial action of past hazardous waste disposal sites.

To conduct the IRP Phase I-Hazardous Materials Disposal/Spill Sites Records Search for Gowen Field, HMTC was retained on September 6, 1984, under Contract No. DLA900-82-C-4426, with funds provided by the ANG.

The Records Search, comprising Phase I of the DOD IRP, is intended to review installation records to identify possible hazardous waste contaminated sites and to assess the potential for contaminant migration from the installation. Phase II (not part of this contract) consists of follow-on field work recommended in Phase I. Phase II consists of a preliminary survey to confirm or rule out the presence and/or migration of contaminants and, if necessary, additional field work to determine the extent and magnitude of the contaminant migration. Phase III (not part of the contract) consists of development of any required new technology to abate unique contamination problems. Phase IV (not part of this contract) includes those efforts to evaluate alternatives for remedial actions, and any efforts required to control identified hazardous conditions.

B. Authority

The identification of hazardous material disposal sites at Air Force installations was directed by DEQPPM 81-5 dated 11 December 1981, and implemented by an Air Force message dated 21 January 1982, as a positive action to ensure compliance of Air Force installations with existing environmental regulations. The ider ification of hazardous material disposal sites at selected ANG bases/installations was directed by the Civil Engineering Division in a letter from the Air Directorate NGB/DE dated 18 March 1981.

C. Purpose

The purpose of the Phase I Records Search is to identify and evaluate suspected problems associated with past hazardous materials handling procedures, disposal sites, and spill sites on DOD facilities. The existence and potential for migration of hazardous material contaminants was evaluated at Gowen Field by reviewing existing environmental information, analyzing installation records, and conducting interviews with past and present employees at Gowen Field. Pertinent information includes the history of operations, with special emphasis on past hazardous materials management procedures; the geological and hydrogeological conditions that may facilitate migration of the potential contaminants; and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

D. Scope

The scope of this Records Search phase of the Gowen Field IRP included:

- Onsite base visit
- Meeting with personnel from various agencies of the State of Idaho
- Review and analysis of all information obtained
- Preparation of report to include recommendations for further action.

The onsite visit and meetings with Idaho State Agency personnel were conducted during the period September 17-21, 1984. The titles of the government agencies are listed in Appendix A. The HMTC Records Search Team consisted of the individuals listed below. Appendix B contains the resumes of these team members:

1. Mr. Donato Telesca, Project Manager/Chemical Engineer, (B.S. Chemical Engineering, 1948)
2. Mr. Torsten Rothman, P.E., Environmental Engineer (M.S. Environmental Health Engineering, 1969)

3. Mr. William Eaton, Hydrogeologist (M.S. Environmental Sciences, 1983)

4. Mr. Marcus Peterson, Ecologist (M.S. Water Resources Management, 1983)

Individuals from the ANG who assisted in the Gowen Field ANG Base Records Search included:

1. Mr. Harold E. Lindenhofen, ANGSC, ANG Program Manager for the IRP

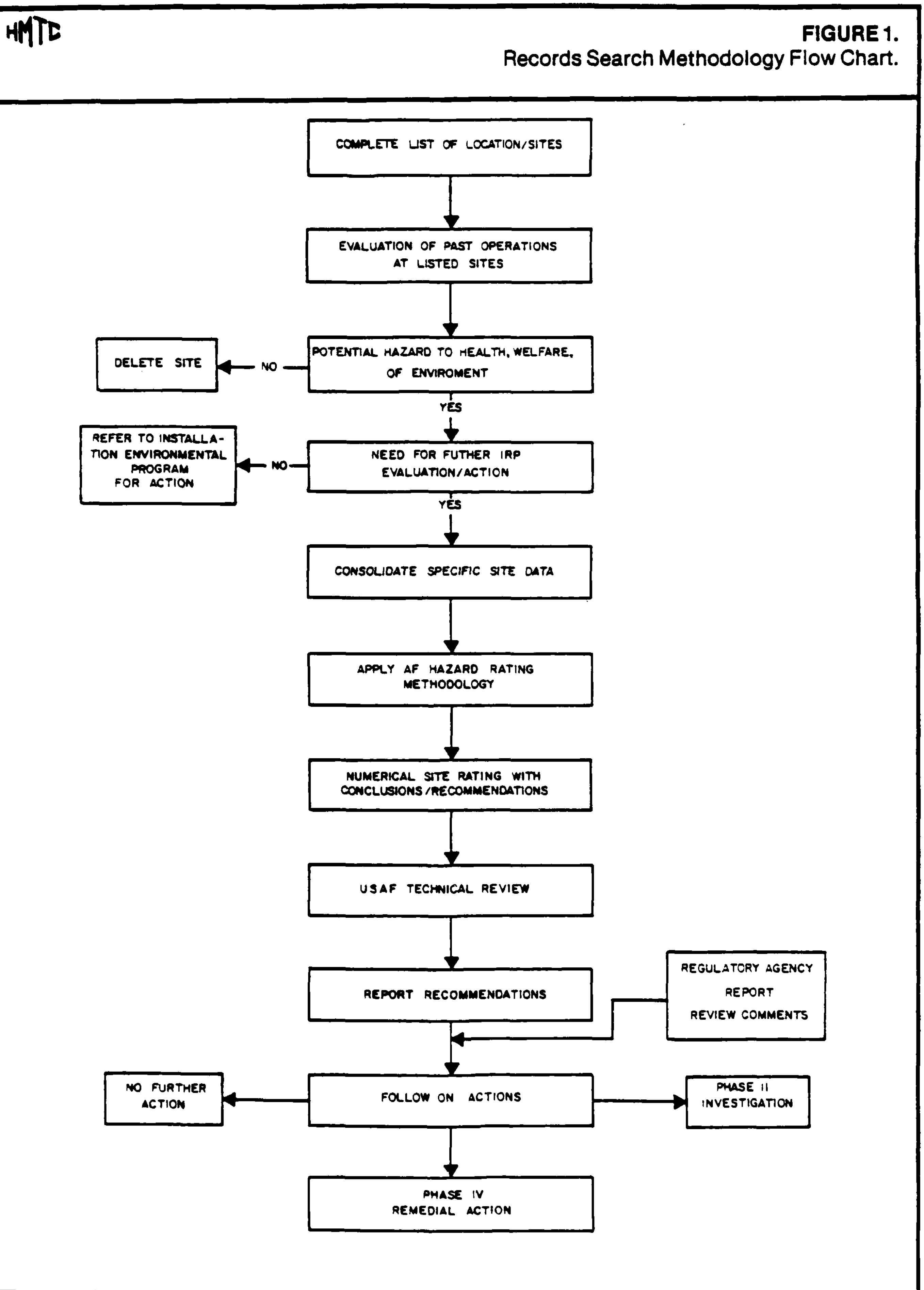
2. Lt. Col. Clayton B. Anderson, Gowen Field, Installation Engineer

E. Methodology

Figure 1 is a flow chart of the Records Search methodology utilized in the present study. Such a guideline helped to ensure a thorough and objective evaluation. The evaluation began by identifying all sites or locations at Gowen Field where hazardous materials were used. Subsequently, an evaluation of past and present operating procedures at the identified sites/locations was made to determine whether or not environmental contamination may have occurred.

Identification of hazardous materials sites/locations and evaluation of the contamination potential were facilitated by extensive interviews with past and present base employees familiar with the various operating areas of the base. Appendix C lists the identification numbers of the 19 people interviewed, their principal areas of knowledge, and their years of experience at the installation. Additionally, historic blueprints of the base and available records contained in shop files and real property files were reviewed as a means to supplement information obtained from the interviews. A general ground tour of identified sites was made by the Records Search Team to gather site-specific information helpful for determining the potential for contamination and contaminant migration. Such information included presence of nearby drainage ditches or surface-water bodies and any visible evidence of contamination or leachate migration.

FIGURE 1.
Records Search Methodology Flow Chart.



If an activity was identified that indicated a potential to have contaminated the environment, then the site/location where this activity took place was evaluated to determine the potential for migration of the contaminant(s). Following the first three steps in Figure 1, 7 of the original 13 sites were eliminated from further consideration because, in the judgment of the investigators, these 7 sites have little or no potential for contamination, contaminant migration, or adverse environmental impacts. Those sites characterized as having the potential for contaminant(s) migration were assessed in detail, using the USAF Hazard Assessment Rating Methodology, as described in Appendix D. The site rating indicates the relative potential for environmental impact at each site. For those sites showing a significant potential, recommendations were made to confirm and quantify the potential contaminant migration problem under Phase II of the IRP.

II. INSTALLATION DESCRIPTION

A. Location

Gowen Field is located within the boundaries of Boise Air Terminal and the southern limits of the City of Boise in Ada County, Idaho. The Greater Boise area, with a population exceeding 150,000, extends north of Gowen Field and has expanded west and northwest of the base. Gowen Field consists of approximately 570 acres; an additional 1,425 acres, including the runways, are in joint use with Boise Air Terminal. Gowen Field lies at an elevation of 2,850 feet above sea level, with the airfield at approximately 43° 33' N latitude and 116° 13' W longitude.

A regional locator map that indicates the location of Gowen Field within Ada County is presented in Figure 2, and vicinity and site maps are provided in Figures 3 and 4, respectively.

B. Organization and History

The origins of Gowen Field date back to 1939 when the Boise Air Terminal was developed under the Works Progress Administration. The airfield was leased to the War Department in 1941 for use as an Army Air Corps base. It was named Gowen Field on July 24, 1941, in memory of Lt. Paul R. Gowen who was killed in an airplane crash in Panama in 1938. The Army Air Corps base was actively used throughout WW II to train bomber crews employing B-17s and B-24s.

The airfield was returned to the City of Boise after WW II for operation as a joint civil/military airport. Portions of Gowen Field were leased for family dwellings and varied commercial activities. The State of Idaho was allotted an Air National Guard (ANG) unit on October 13, 1946. The first unit based at Gowen Field was the 190th Fighter Squadron, formerly the 405th Fighter Bomber Squadron during WW II. The first P-51 Mustangs were received in November of 1946.

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Figure 2.
Location of Gowen Field Within Ada County, Idaho.

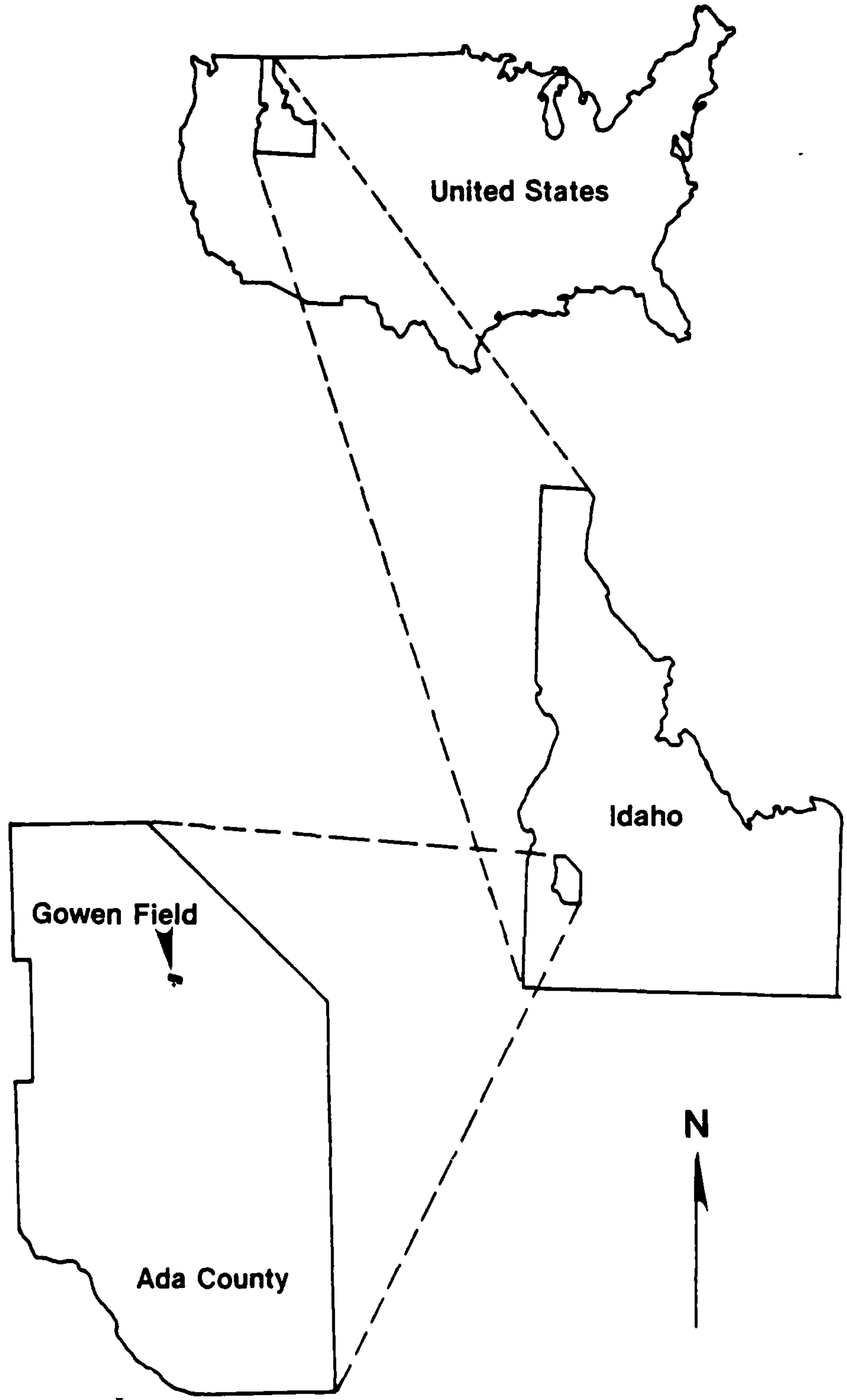

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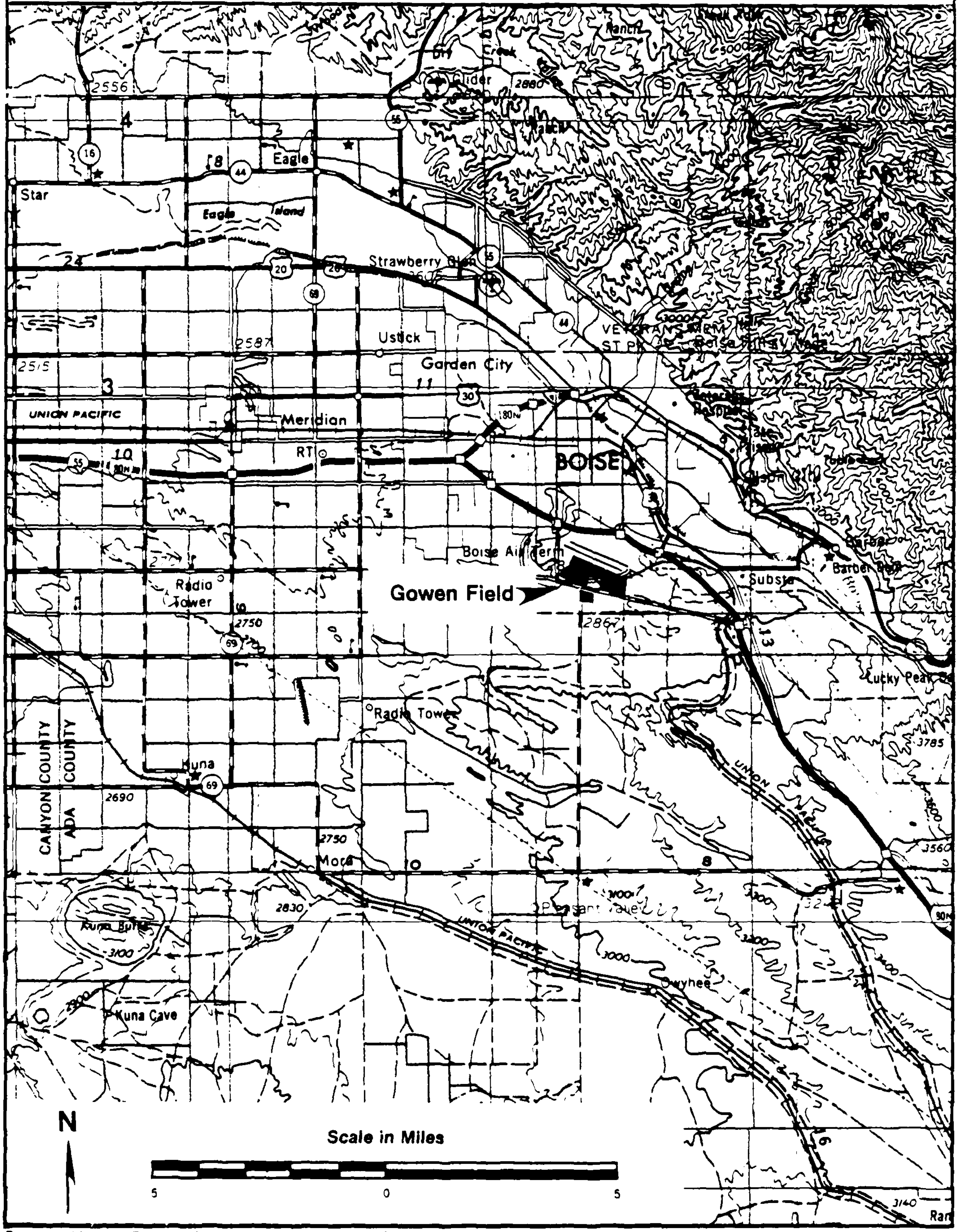
Figure 3.
Vicinity Map of Gowen Field.



Source: United States Geological Survey (U.S.G.S.)

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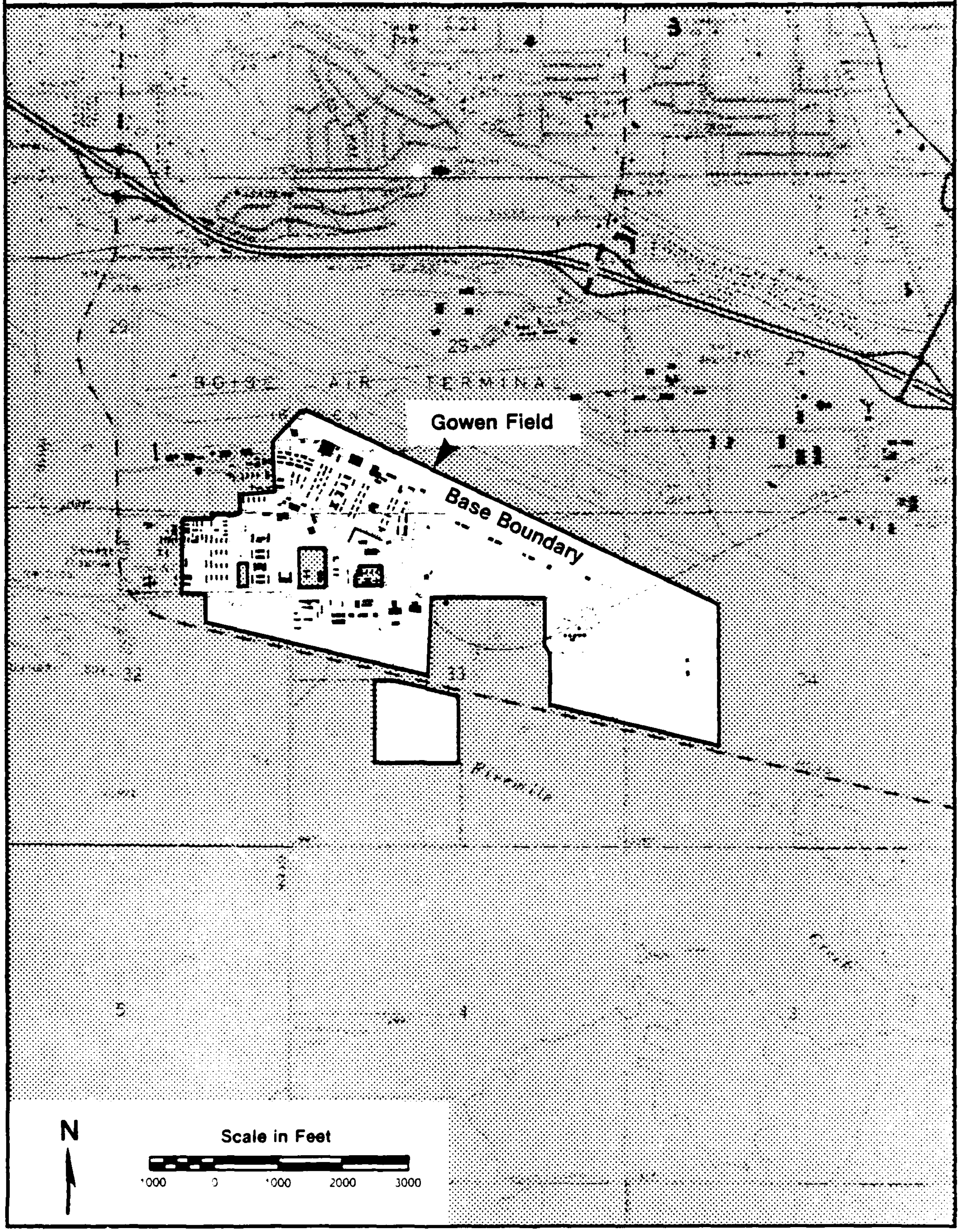
Figure 4.
Site Map of Gowen Field.



Source: U.S.G.S.

Activities at Gowen Field decreased substantially during the Korean conflict. The 190th Fighter Squadron was called into Federal service on April 1, 1951, and released on December 31, 1952. The Idaho ANG first held Summer Field Training at Gowen Field in 1952. Following a general Air National Guard reorganization in 1953, Gowen Field was designated one of eight permanent training sites. New T-33 trainers were received in October, 1953, and the P-51 Mustangs were replaced by F-86A Sabres in November of that year. Idaho Army National Guard (ARNG) units began annual field training at Gowen Field in 1953 and have continued these activities to date. Approximately 250 square miles of desert to the south of Gowen Field was acquired for use as a firing range and maneuver area.

On June 18, 1955, Gowen Field was designated a U.S. Air Force Aviation Cadet Testing Center for prospective ANG pilots, and the first F-94B aircraft were received that year. In March of 1956 the Idaho ANG was redesignated the 190th Fighter Interceptor Squadron and given a mission of long-range, all-weather interception. The unit was renamed the 124th Fighter Interceptor Group on April 15, 1956, and received its first F-89B twin-jet interceptors. F-86L aircraft were received in 1959, and the unit mission remained unchanged until 1961.

The Idaho ANG was placed on 24-hour alert status in 1961, and the National Guard Bureau terminated Gowen Field's ANG designation as a Permanent Field Training Site effective July 1, 1962. At that time Gowen Field became designated as an ARNG Permanent Field Training Site. The F-86s were replaced with F-102 Delta Daggers in 1964. The group retained its mission as an Aerospace Defense Command Unit until 1975.

On October 17, 1975, the F-102s were replaced with RF-4Cs and the mission was changed to photo reconnaissance under the Tactical Air Command. The unit was renamed the 124th Tactical Reconnaissance Group and has retained this mission to date.

Today, the airfield complex at Gowen Field consists of two active runways. The main runway, with full navigational aids and arresting gear systems, measures 9,700 feet in length; the second runway is 7,200 feet long. The existing structures at Gowen Field used for operations and maintenance are fully occupied and in use. Gowen Field also has a base exchange, a dispensary and messing and billeting facilities for approximately 3,000 people.

The Idaho ARNG maintains a training area approximately 12 miles south of Gowen Field, which serves as an exercise range for tracked vehicle and helicopter forces. The nearest major military installation to Gowen Field is Mountain Home Air Force Base, located approximately 45 miles to the southeast.

C. Mission

Gowen Field is the home of the Idaho ANG, as well as several units of the Idaho ARNG and a contingent of the U.S. Marine Corps. The host unit for Gowen Field is the Installation Command, IDANG which, along with the 124th Tactical Reconnaissance Group of the U.S. Air Force Tactical Air Command, has the mission to train in high- and low-level tactical photo reconnaissance for military intelligence applications. Unit members fly on weekends and attend annual summer training exercises. The Idaho ANG supports a normal contingent of 32 RF-4C tactical fighters and 1 C-131D aircraft.

The maintenance of operational readiness is conducted for the most part by 460 full-time Federal Civil Service technicians and active guard reserve assigned to the ANG. The Idaho ARNG employs 360 Federal Civil Service technicians, and Active Guard Reservists, and 55 State of Idaho employees at Gowen Field. The various ARNG units are equipped with 27 UH1H/M and 14 OH-58 helicopters, over 200 tanks and other large tracked vehicles. All units of the Idaho ARNG share a common mission to provide assistance to State and Federal agencies in times of flood, drought or other natural disasters, as well as to help in search and rescue operations.

The host unit operates and maintains the installation and provides support for the following tenant units:

Air National Guard

Headquarters, Idaho Air National Guard
124th Tactical Reconnaissance Group
124th Combat Support Squadron
124th Tactical Clinic
124th Consolidated Aircraft Maintenance Squadron
124th Communications Flight
124th Weapons Systems Security Flight
124th Civil Engineering Flight
124th Headquarters Squadron
124th Resource Management Squadron
190th Tactical Reconnaissance Squadron
189th Tactical Reconnaissance Training Flight
Reconnaissance Weapons School

Army National Guard

116th Air Cavalry Troop
116th Armored Cavalry, Detachment - 1
116th Maintenance Company
148th Public Affairs Detachment
158th Engineering Detachment
748th Medical Detachment
Training Site Unit
Headquarters Unit

United States Marine Corps Reserve

Tank Company C

State of Idaho

Office of the Adjutant General

United States Property and Fiscal Office

Bureau of Disaster Services

III. ENVIRONMENTAL SETTINGS

A. Meteorology

The climate in the area of Gowen Field is generally classified as dry and temperate. The data in Table 1 (National Oceanic and Atmospheric Administration, 1979) are the official records for Boise Air Terminal, located contiguous to Gowen Field. Although this data summary is only through the year 1979, more recent data are expected to follow the indicated trends. The data in this table indicate that winters are cool and relatively more humid while summers are generally dry, sunny and warm. The maximum and minimum daily temperatures, averaged for all days on record (1941 to 1970), are 62.6° and 39.1°F, respectively. The first freezing temperature (32°F) occurs on October 12, on the average. The frost-free growing season on average begins May 6. The highest temperature ever recorded was 111°F in July, 1960. The lowest recorded temperature was -23°F in December, 1972.

Precipitation averages 11.5 inches per year at Gowen Field. Net precipitation; however, is a negative 22.5 inches per year due to the high total annual evaporation in this area of the country. The normal precipitation pattern shows a winter maximum and a very pronounced summer minimum. Most of the winter precipitation is in the form of rainfall associated with thunderstorms, which are spaced erratically. Some damage from heavy rains, windstorms and hail occurs each year, but tornadoes are very infrequent. Snowfall is generally light with accumulations seldom lasting more than a few days. Heavier snowfalls often occur in adjacent mountain ranges and can contribute to occasional spring flooding. Glaze storms are not numerous since this area is north of the main path of freezing rain.

The prevailing winds in the area of Gowen Field are southeasterly, although northeasterly winds can be equally important on a seasonal basis. Monthly average wind speeds normally exceed 8 mph but rarely exceed 11 mph. Annual average windspeed is 8.9 mph.

Table 1.
Summary of the Meteorological Data for Boise, Idaho.

	Temperature °F: Normal			Precipitation (inches): Water equivalent							Precipitation (inches): Snow, ice pellets				Relative humidity (pct)				Wind					Mean number of days							
																					Fastest observed							Temperature °F Max.		Temperature °F Min.	
	Daily Maximum	Daily Minimum	Monthly Average	Normal	Maximum monthly	Year of occurrence	Minimum Monthly	Year of occurrence	Maximum in 24 hrs.	Year of occurrence	Maximum monthly	Year of occurrence	Maximum in 24 hrs.	Year of occurrence	Hour of occurrence	Hour of occurrence	Hour of occurrence	Hour of occurrence	Mean Speed (m.p.h.)	Prevailing direction	Speed (m.p.h.)	Direction (bearing)	Year	Precipitation: .01 inch or more	Snow, Ice pellets: 1.0 inch or more	Thunderstorms	Heavy fog, visibility 1/4 mile or less	90° and above	32° and below	32° and below	0° and below
(a)					40		40		40		40		40		40	40	40	40	40	24	40	40		40	40	40	40	40	40	40	40
J	36.5	21.4	29.0	1.47	3.87	1970	0.12	1949	1.48	1953	21.4	1964	8.5	1950	80	73	70	79	8.4	SE	50	SE	1941	13	3	*	5	0	10	26	2
F	43.8	27.2	35.5	1.16	2.62	1975	0.19	1964	1.00	1951	25.2	1949	13.0	1949	80	68	61	77	9.2	SE	56	W	1954	10	1	*	3	0	3	21	*
M	51.6	30.5	41.1	1.01	2.27	1957	0.18	1944	1.12	1943	11.9	1951	6.4	1952	73	55	44	67	10.2	SE	52	W	1957	9	1	1	1	0	*	18	0
A	61.4	36.5	49.0	1.14	3.04	1955	0.09	1949	1.27	1969	8.0	1967	7.2	1969	70	47	36	60	10.3	SE	50	W	1942	8	*	1	*	*	0	8	0
M	70.6	44.1	57.4	1.32	4.00	1942	0.09	1940	1.51	1942	4.0	1964	4.0	1964	69	45	34	58	9.6	NW	50	W	1954	8	*	3	*	1	0	2	0
J	78.3	51.2	64.8	1.06	3.41	1941	0.01	1966	2.24	1958	T	1954	T	1954	67	42	30	53	9.1	NW	50	SW	1948	6	0	3	*	5	0	0	0
J	90.5	58.5	74.5	0.15	1.15	1976	0.00	1947	0.94	1960	T	1970	T	1970	53	33	21	39	8.5	NW	61	W	1944	2	0	3	0	19	0	0	0
A	87.6	56.7	72.2	0.30	2.37	1968	T	1969	1.61	1979	0.0		0.0		52	34	23	40	8.3	NW	56	SE	1963	3	0	2	0	15	0	0	0
S	77.6	48.5	63.1	0.41	2.54	1959	T	1974	1.74	1976	0.0		0.0		58	39	30	48	8.3	SE	50	SE	1960	4	0	1	*	3	0	*	0
O	64.7	39.4	52.1	0.80	2.25	1956	T	1978	0.76	1947	2.7	1971	1.7	1971	67	48	40	61	8.5	SE	56	SE	1950	6	*	1	1	*	0	5	0
N	48.9	30.7	39.8	1.32	2.44	1973	0.14	1976	0.88	1971	8.8	1973	6.5	1964	77	65	60	75	8.5	SE	57	NW	1953	10	1	*	3	0	1	18	*
D	39.1	25.0	32.1	1.36	3.19	1964	0.09	1976	1.16	1955	15.6	1951	6.6	1953	81	73	71	80	8.4	SE	56	NW	1950	11	2	*	6	0	6	25	*
YR	62.6	39.1	50.9	11.50	4.00	MAY 1942	0.00	JUL 1947	2.24	JUN 1958	25.2	FEB 1949	13.0	FEB 1949	69	52	44	61	8.9	SE	61	W	JUL 1944	91	8	15	19	43	19	124	2

Net precipitation equals negative 22.5 in. per year.
Source - Local Climatological Data, Boise Air Terminal Meteorology Office, Idaho, Revised Data Through 1979.
Means and extremes - From existing and comparable exposures.
Normals Based on the record for the interval 1941-1970.

(a) Length of record, years, through the current year unless otherwise noted, base on January data
(b) Through 1963
* Less than one half
T Trace

B. Geology

1. Regional Geology

Gowen Field is located within the Snake River Plateau, just south of the foothills to the mountainous terrain of central Idaho. This mountainous terrain to the north developed in response to regional uplift of the earth's crust that began approximately 70 million years ago (Early Tertiary Period). Coincident with uplift of the crust to the north, crustal downwarp occurred to the south along what is now referred to as the Snake River Downwarp. The downwarp is given this name because a major segment of the Snake River in Idaho is coincident with the trough of this downwarp, which forms a broad U-shaped arc more than 400 miles long and 50 to 120 miles wide across the southern portion of Idaho. The trough tilts toward the west at a rate of approximately 10 feet per mile; therefore, the Snake River generally flows from east to west.

Subsequent to development of the Snake River Downwarp, compressional crustal stresses relaxed, thus allowing fissures to form within the earth's crust from which exceptionally large volumes of lava were extruded. The earliest and largest volumes of these lavas are referred to as the Columbia River Basalt. These lavas and eroded sediments from the uplifted area to the north began to fill the depression caused by the Snake River Downwarp. The weight of the lava and sediments, which began to accumulate within the depression, induced additional crustal downwarp (isostatic adjustment) and additional faulting, and extrusion of more recent lava. Thus, the lavas and sediments from the north are interbedded rather than being present as two discrete, isolated layers or zones.

One consequence of the sporadic extrusion of lavas was the frequent alteration of surface drainage patterns and the formation of large lakes, due to development of lava dams. The sediments, which accumulated within these lakes, are referred to as lacustrine deposits. They tend to be evident today as well-defined layers of sand, silt, and clay which are

readily distinguishable from the poorly sorted conglomerates, breccias and gravel deposits characteristic of those sediments within the Snake River Downwarp, which were directly deposited by surface streams rather than within lakes. Ultimately, the lakes became completely filled with sediments and broad alluvial plains developed as topographic transitions between the northern highlands and southern lowlands. The thick sequence of completely interbedded sediments described above is referred to as the Glenns Ferry Formation in the vicinity of the present study area.

The last important phases in the geologic evolution of the Boise area are associated with Pleistocene glaciation and recent surface rivers and streams. Meltwaters from Pleistocene glaciation carried extensive volumes of subangular, crystalline gravel deposits from the mountains to the lowlands along the Snake River. Two episodes of Pleistocene disposition resulted in two discrete units, which are referred to as the older and younger terrace gravels. During deposition of these terrace gravels, basalt of the Snake River Group extruded which presently exhibits columnar jointing. Most recently, the Boise River and its tributary streams have deposited unconsolidated alluvium, consisting of silt, sand and well-sorted gravel, which presently occupies the floodplains of the Boise River.

2. Local Geology

Table 2 summarizes the major rock units in the immediate vicinity of Gowen Field, and the physical characteristics of these rock units. Figure 5 is a geologic map that shows the locations where these rock units are exposed at the earth's surface. From this figure, it is apparent that Gowen Field is immediately underlain by the Pleistocene-aged older terrace gravel which consists of unconsolidated silt, sand, and well-sorted gravel beds characterized by cut-and-fill channels, inclined bedding and cross bedding. To the south of Gowen Field, basalt of the Snake River Group is present. It is this rock unit that composes the elevated bluffs visible to the south of the base.

Table 2.
Descriptions of the Geological Formations in the Immediate Vicinity of Gowen Field.

SYSTEMS	FORMATION	AGE (Millions of Years)	THICKNESS (Feet)	DESCRIPTION
HOLOCENE	Recient alluvium and surficial deposits	1	50 ±	Unconsolidated silt, sand, and well-sorted gravel; primarily comprising the floodplain of the Boise River.
PLEISTOCENE & HOLOCENE	Younger terrace gravel	1 to 2	100 ±	Unconsolidated clay, silt, sand and well-sorted gravel which contains pebbles and cobbles of the Idaho Batholith and the Snake River Group Basalts.
	Basalt of the Snake River Group	1 to 2	300 ±	Columnarly jointed, vesicular olivine basalt. Often hydrothermally altered and interbedded with pyroclastic debris.
PLEISTOCENE	Older terrace gravel	2	150 ±	Unconsolidated silt, sand, and well-sorted gravel beds characterized by cut-and-fill channels, inclined bedding and cross-bedding.
PLIOCENE & PLEISTOCENE	Glenns Ferry Formation	2 to 5	2000 ±	Unconsolidated, complexly intertongued continental deposits of clay, silt, sand and fine gravel. Often interbedded with volcanic ash and lava flows of olivine basalt.
CRETACEOUS	Idaho Batholith	100	>2000	Original bedrock in which the Snake River downwarp was formed. Consists of gray quartz monzonite and granodiorite, with associated schists and gneisses.

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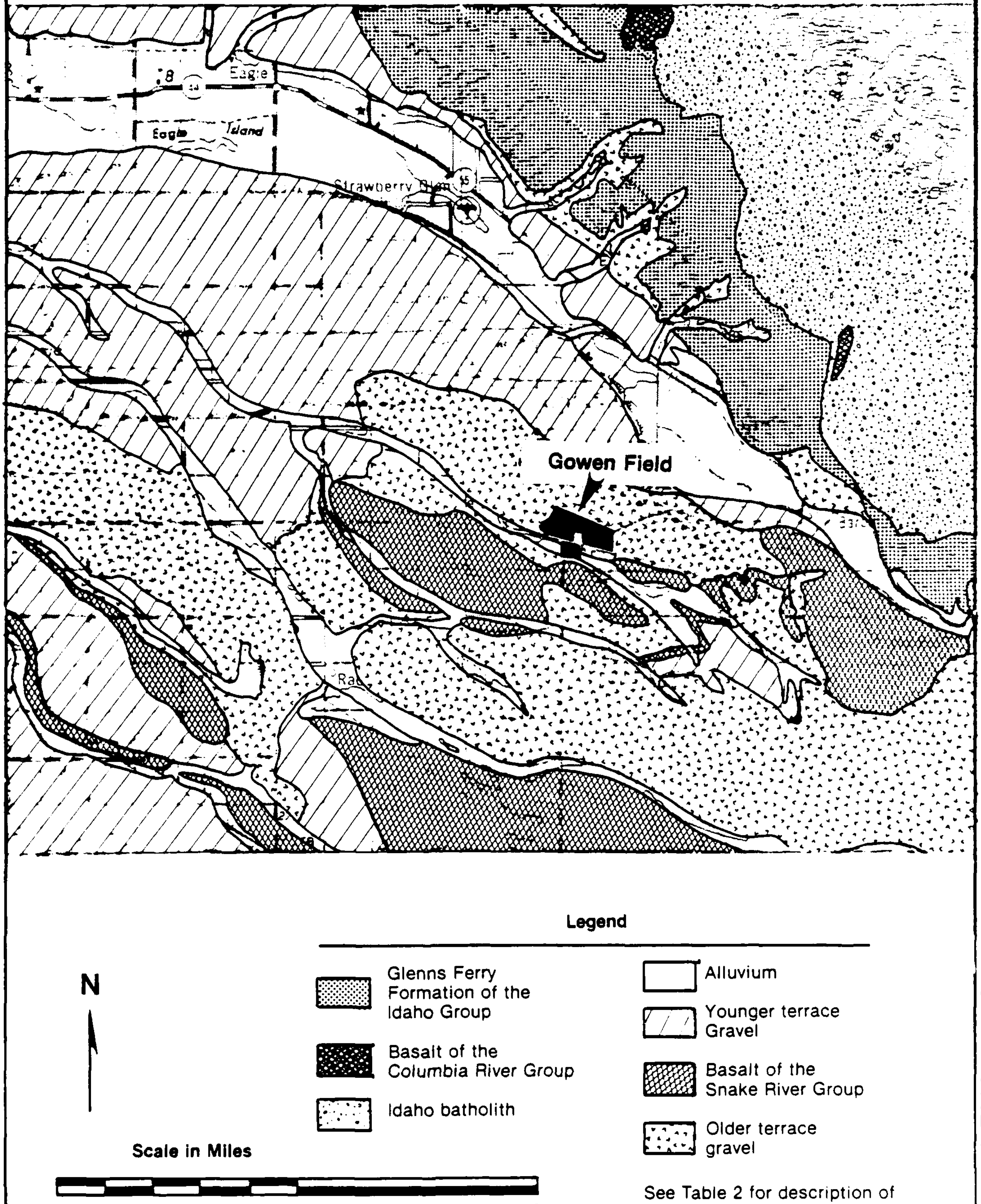
Figure 5.
Generalized Geological Map of Ada County in the Vicinity of Gowen Field.



See Table 2 for description of geological formations

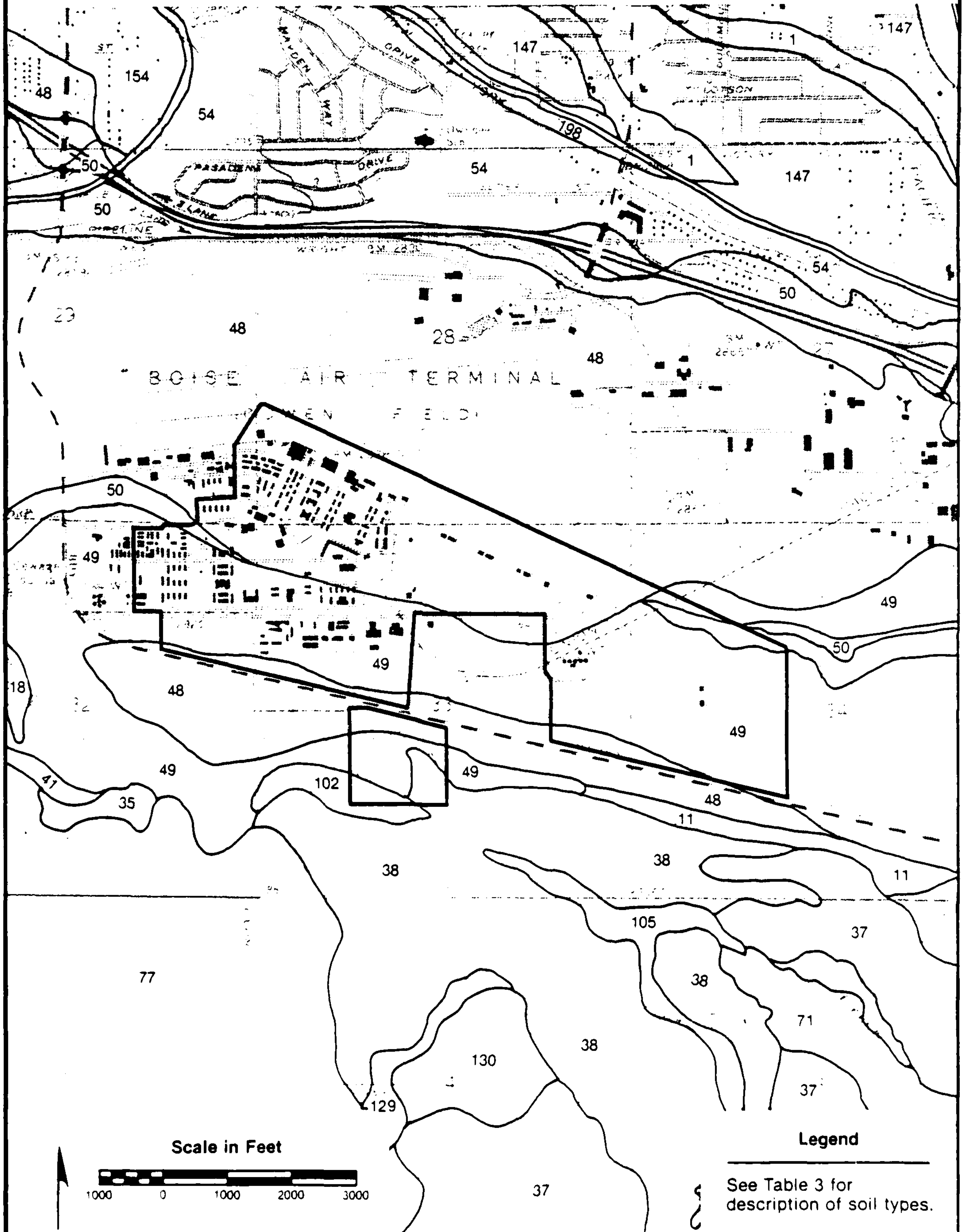
Source: U.S.G.S.

The types of soils that have developed on these unconsolidated geologic formations are described in the soil survey for the Ada County area of Idaho (Collet, et al., 1980). One basic soil type encompasses all of Gowen Field and is named the Elijah Silt Loam. The only variation described for the Elijah Silt Loam throughout the area of Gowen Field is the surface slope, which has developed on this soil. In no instance is the slope described as exceeding eight percent. Throughout most of the area, the slope is either between 0 and 2 percent or between 2 and 4 percent. The extent of the Elijah Silt Loam and the areas of various slopes are illustrated in Figure 6.

The Elijah Silt Loam is described as a well-drained, moderately deep soil that contains a hardpan. The parent material, of which this soil is composed, is loess (wind blown sediments) and alluvium consisting of gravel, sand, silt, and clay. The typical section through this soil consists of a surface layer of pale brown silt loam approximately 11 inches thick, which is underlain by a brown and yellowish brown silty clay loam subsoil with a thickness of about 15 inches. Underlying this is a 5-inch thick substratum of very pale brown loam and a light gray hardpan with a thickness of about 12 inches. The depth to the hardpan ranges from 20 to 40 inches. Underlying the hardpan are interbedded, unconsolidated sand and gravel.

Some physical characteristics of this soil are that permeability is moderately slow above the hardpan and very slow through the hardpan. Downward migration of fluids through the hardpan is primarily facilitated by fractures developed within the hardpan. However, due to the presence of fractures within the hardpan, downward migration of fluid will occur, although at a slower rate than would otherwise occur if the hardpan were not present.

Figure 6.
Map of Soils in the Vicinity of Gowen Field.



Source: U.S.D.A., Soil Conservation Service and U.S.G.S.

The presence of the hardpan at Gowen Field is documented by the records of test borings which were drilled near the avionics shop (NG 155) by the Northern Testing Laboratories. These records consistently document the presence of silty clay cemented with caliche (hardpan), which was present to a depth of between 3.4 to 4.4 feet below ground surface. Hardpans are common in arid and semi-arid regions where high rates of evaporation of soil moisture encourage the precipitation of salts within the subsoil.

Table 3 summarizes several properties of the Elijah Silt Loam that are important with regard to migration of contaminants. These properties include the erodibility of the soil by wind and water and the permeability of the various subsurface horizons. Despite the sandy and silty nature of this soil, its susceptibility to erosion by water is only slight to moderate due to the low surface slopes of less than 8 percent.

Table 3. Properties of the Elijah Silt Loam.

Soil Name and Map Symbol	Depth (in)	Permeability (in/hr)	Permeability (cm/sec)	Erodibility by Water	Erodibility by Wind
Elijah Silt Loam (48, 49, 50)	0-11	0.6-2.0	4.2×10^{-4}-1.4×10^{-3}	Slight to moderate	Slight
	11-26	0.2-0.6	1.4×10^{-4}-4.2×10^{-4}	b	b
	26-31	0.6-2.0	4.2×10^{-4}-1.4×10^{-3}	b	b
	31-43	a	a	b	b
	43-96	>20	$>1.4\times10^{-2}$	b	b

a. Data not available

b. Not applicable to subsurface horizons

C. Hydrology

1. Surface Water

Gowen Field is located within the drainage basin of the Boise River. The Boise River flows from the southeast to the northwest and, at its closest position, is about 3 miles northeast of Gowen Field. The base is not within the 100-year floodplain of the Boise River. The surface stream, which is closest to the base, is Fivemile Creek located immediately south of the base. It also flows from the southeast toward the northwest, roughly parallel to West Gowen Road. Substantial segments of Fivemile Creek are within the boundaries of Gowen Field; therefore, the boundaries of the 100-year floodplain associated with Fivemile Creek are illustrated in Figure 7. These boundaries were determined by the Federal Emergency Management Agency. Those areas where the Fivemile Creek 100-year floodplain is on base property are approximately coincident with the southernmost extension of Zeppelin Street and a 2,500-foot segment of West Gowen Road. The most important base activities which have the potential to be impacted by floodwater from Fivemile Creek are the two oil/water separators operated by the Mobilization and Training Equipment Site (MATES) and an old oil spillsite located approximately 700 feet south-southwest of the main entrance gate guardhouse for Gowen Field. Both of the separators and the oil spill site will be discussed in subsequent chapters of this report.

Neither the Boise River nor Fivemile Creek are used for drinking water supplies by the town of Boise or other nearby communities. The primary use of the Boise River is for irrigation of crop and grazing lands. Irrigation water is stored within surface impoundments near the headwaters of the Boise River, which are located approximately 15 miles east of Gowen Field. At times of need, water is released from these impoundments into the Boise River and then, from the Boise River, the water is distributed via a system of open canals. The closest canal to Gowen Field is the New York Canal; however, no base activities are likely to affect this canal. The canal does

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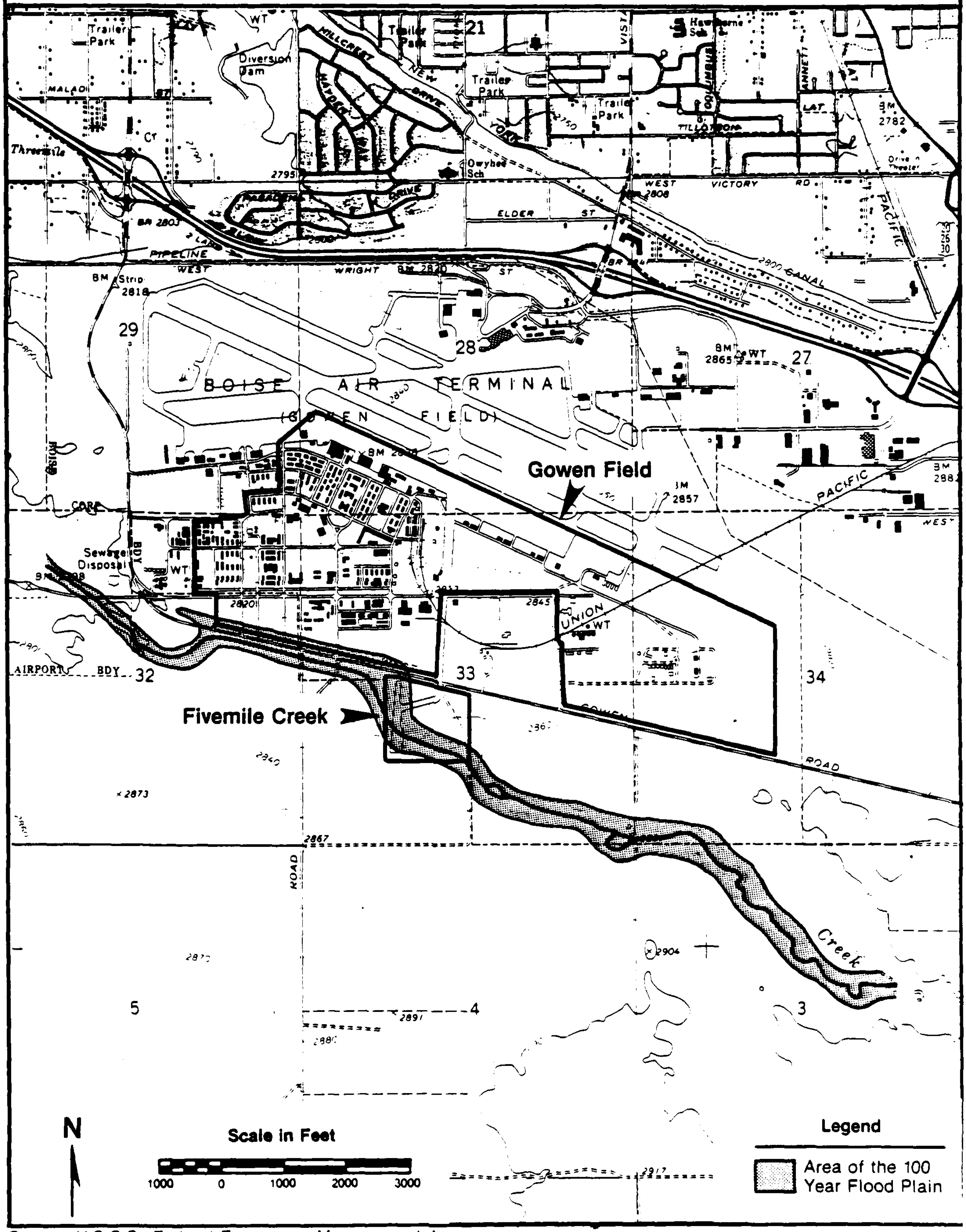
Figure 7.
Position of Fivemile Creek and Extent of the 100-Year Flood Plain



Source: U.S.G.S., Federal Emergency Management Agency

influence shallow groundwater table elevations, as will be discussed in subsequent pages of this report.

Surface drainage at Gowen Field primarily occurs along the flow paths illustrated in Figure 8. It is controlled both by the local surface topography and a system of drainage ditches. The most important drainage ditch generally traverses the base in an east-west direction with a flow direction toward the west.

2. Groundwater

The deep aquifer system in the vicinity of Gowen Field is an important resource in that it is the primary source of water for domestic, municipal, and industrial purposes. Fortunately, the hydrogeologic setting at Gowen Field is such that the underlying aquifer systems are fairly well protected from surface sources of contamination. The principal aquifers which underlie Gowen Field are classified as either the deep aquifer system or the shallow aquifer system.

The water table within the shallow aquifer system generally occurs at a depth of approximately 100 feet below ground surface at the base (Dion, 1982; Bunn, personal communication, 1984). Figure 9 is a groundwater contour map for the shallow aquifer that illustrates the elevation of the surface of the water table. Also shown is an arrow that indicates the general groundwater flow direction. This arrow indicates that in the immediate vicinity of Gowen Field the groundwater flow direction is toward the south-southeastwardly direction, which is away from the town of Boise. On a regional basis, however, groundwater flow in the Boise area is generally in a westward direction. The shallow aquifer consists of the unconsolidated, older and younger terrace gravels deposited by the Boise River. The only wells that generally draw water from this aquifer are domestic wells for houses that are located so far from town that they are not connected to the public water distribution system. No houses with private wells are located within the immediate vicinity of the base.

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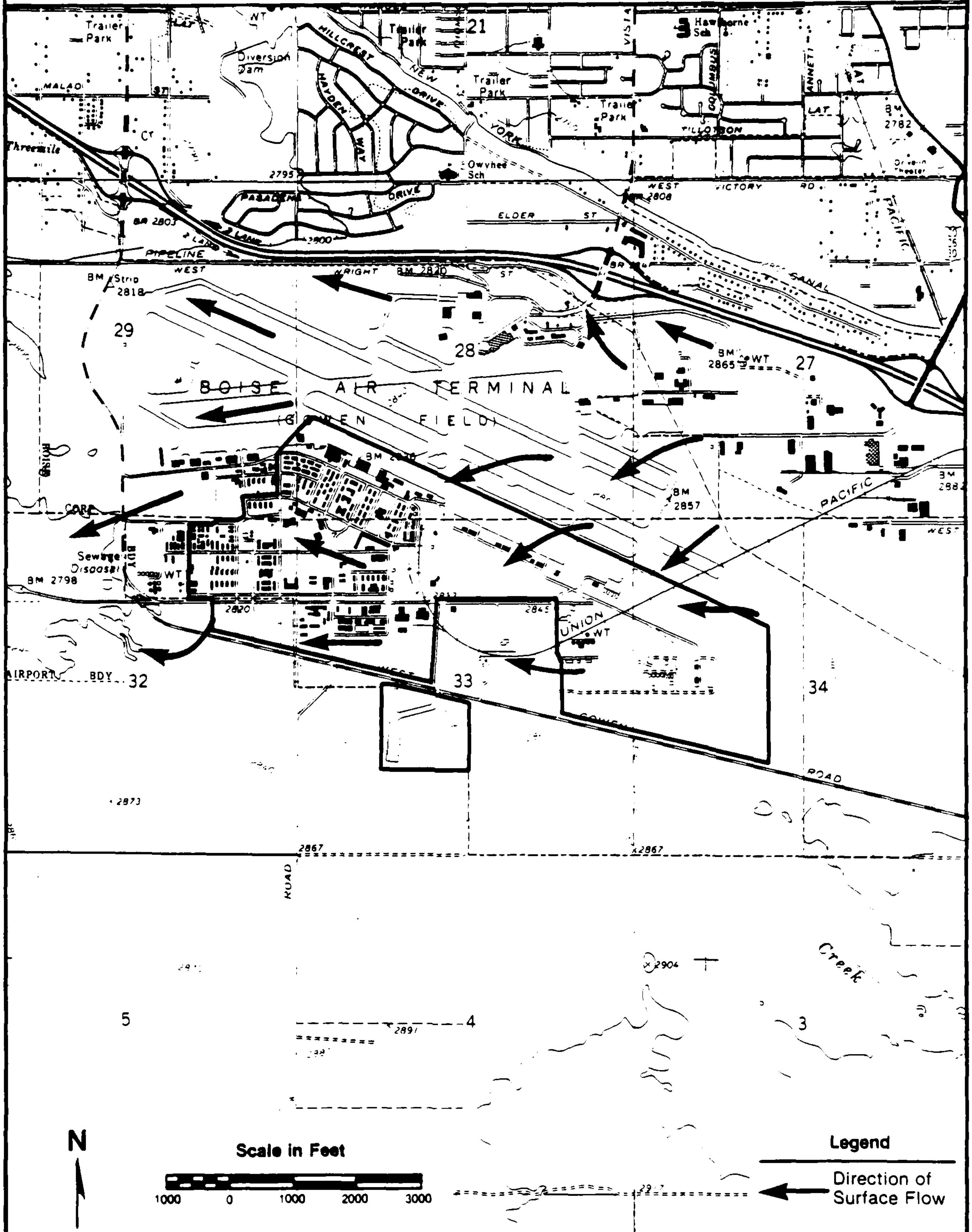
Figure 8.
Directions of Surface Drainage at Gowen Field.



Source: U.S.G.S.

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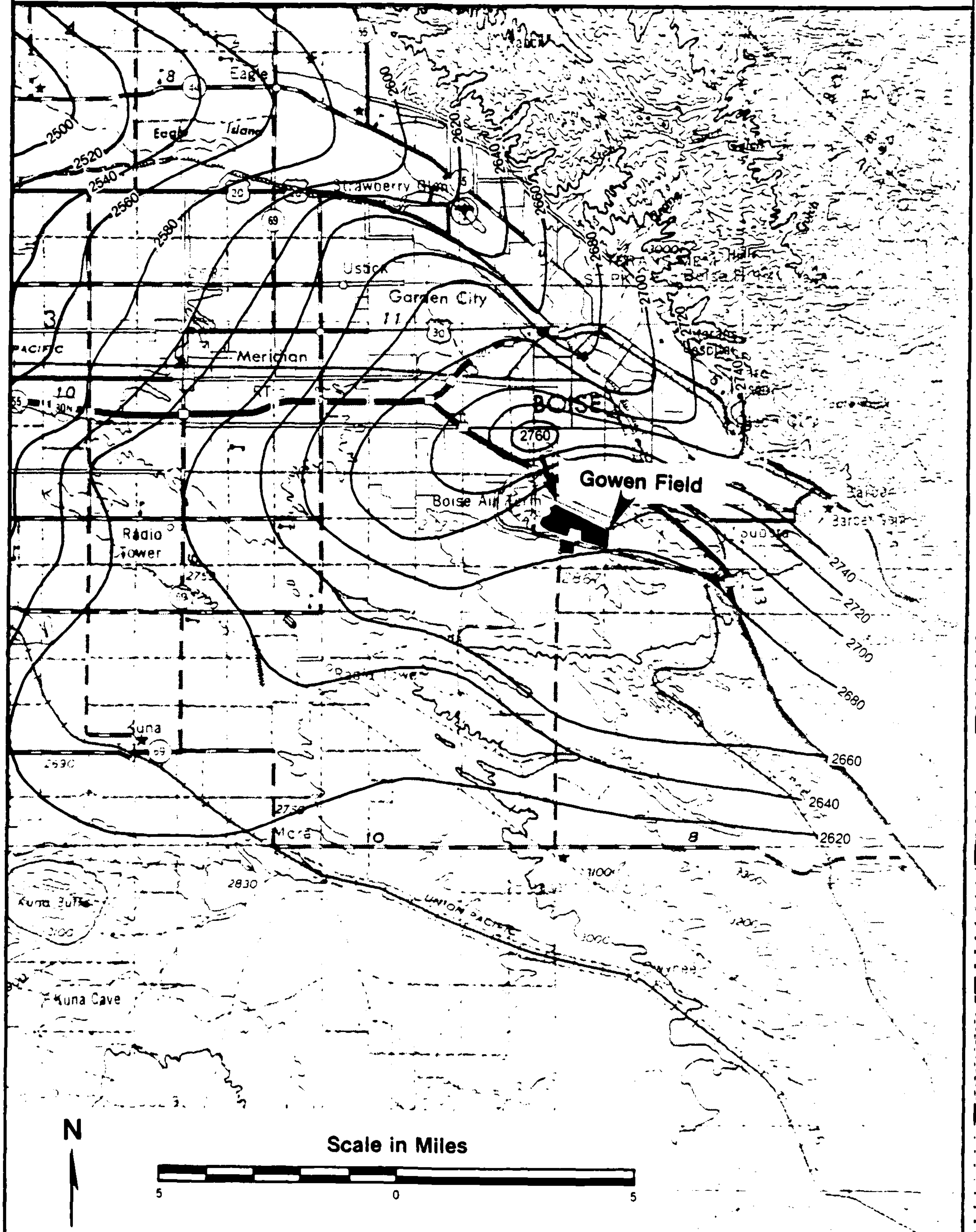
Figure 9.
Water Table Elevation Contour Map of Gowen Field.



Source: U.S.G.S.

The localized south-southeastwardly flow in the immediate vicinity of Gowen Field is in response to a groundwater mound located about 1.5 miles north-northwest of the base. This mound is a result of high rates of artificial recharge to the upper aquifer by water which infiltrates from the New York Canal, which is intended to distribute irrigation water. The shallow aquifer throughout the Boise area owes its existence primarily to the infiltration of water associated with irrigation. This is not only in response to infiltration of water contained within the canals, but also infiltration of irrigation water released to crop and grazing lands and water used for watering lawns. According to a United States Geological Survey report (Thomas and Dion, 1974) on groundwater conditions in the Boise River Valley, groundwater elevations within the shallow aquifer near the Boise River rose as much as 140 feet between 1912 and 1921 due to the widespread application of irrigation water.

As previously indicated, shallow groundwater wells that draw water from the shallow aquifer system are not likely to become contaminated as a result of activities associated with Gowen Field. This is primarily because of the relatively great depth (>100 feet) to the water table within this aquifer and because no private wells are located immediately downgradient of the base. Additionally, the moderately slow permeability above the hardpan and the very slow permeability through the hardpan offer protection to the underlying aquifers. However, the unconsolidated and unsaturated sediments that underlie the hardpan have relatively high downward permeabilities, as evidenced by the fact that surface irrigation water supports the existence of the shallow aquifer. Therefore, localized contamination of the shallow aquifer underlying Gowen Field is likely, in those areas where the hardpan may have been breached by contaminants.

The other major aquifer system in the Boise area is composed of interbedded sand, gravel and basalt of the Glenns Ferry Formation, and it is referred to as the deep aquifer system. It is the aquifer from which most of the Boise Water Corporation wells draw water to supply the majority of residences of the City of Boise with drinking water. For several important reasons, this aquifer is highly unlikely to be contaminated by surface contaminants. First, it is a confined aquifer, which means it is overlain

by relatively impermeable deposits of silt and clay. Second, the depth of this aquifer below the surface is in excess of 500 feet, thereby providing a significant buffer to infiltration of surface contaminants. Finally, the major recharge zone for this well is the foothills to the mountainous region north of Boise where the Glenns Ferry Formation is exposed at the earth's surface. Unlike the shallow aquifer, no portion of the recharge zone for the deep aquifer is coincident with Gowen Field.

D. Environmentally Sensitive Conditions

1. Vegetation and Wildlife

Gowen Field is situated on a relatively flat, expansive, semi-desert plain characteristic of land in the Snake River Plain physiographic subdivision (Kinnison, 1955). The major habitat class at Gowen Field is Annual Grasslands, a class typical of sites disturbed by development or natural events such as fire and erosion. Floral stands are usually dominated by annual grasses, principally cheatgrass and sagebrush, as well as occasional clusters of bunchgrass. Naturally occurring trees and shrubs are virtually absent, while a large variety of forbs are represented in small numbers. This habitat class supports abundant populations of jackrabbits and cottontails; deer, antelope and coyote also frequent this habitat, but in small numbers (Savage, 1958). Principal bird species are magpies, meadowlarks, sparrows and hawks. There are no aquatic habitats apart from the intermittent drainage ditches that pass through or near the base.

With the exception of the City of Boise to the north of the airfield, the areas immediately surrounding Gowen Field are very sparsely settled. Several light industries are located in an industrial park due west of the base; these include a paint manufacturer, a truck painting facility, a culvert manufacturer and fencepost and firewood distributors. A fencepost manufacturing and lumber treatment facility is located at the southern boundary of Gowen Field along with a transport company and steel fabricating

firm. An asphalt manufacturing concern and a lumber treatment operation were formerly located in what is now the southwest portion of Gowen Field. Several aviation maintenance and storage facilities are located to the west of the Idaho ANG hangars and flightline. Areas to the south and southwest of the base are generally unimproved desert land, and include the Idaho ArNG training grounds. A portion of the newly acquired southeast portion of Gowen Field is in agricultural outlease for cattle grazing.

2. Threatened and Endangered Species

There are no species present or likely to be present within a 50-mile radius of Gowen Field that have been listed as being threatened or endangered by the U.S. Fish and Wildlife Service or the State of Idaho. There is a possibility that the American peregrine falcon, listed as an endangered species by the U.S. Fish and Wildlife Service and the State of Idaho, may appear on base as an occasional visitor. However, no sightings or bird strikes involving this species have been reported at Gowen Field.

IV. FINDINGS

A. Activity Review

Table 4 summarizes the activities at Gowen Field that use industrial chemicals and require the management of the resultant used materials or wastes. A review of base records and interviews with past and present base employees resulted in the identification of specific operations within each activity in which the majority of industrial chemicals are handled and hazardous wastes are generated. A brief description of these operations and best estimates of the quantities of wastes generated by each are provided below. Where available, information on specific past operations and industrial chemicals used is included. However, sufficient information in these areas was lacking in many cases. Table 5 summarizes the major operations associated with each activity, provides estimates of the quantities of waste currently being generated by these operations, and describes the past disposal routes for the wastes. If an operation is not listed in Table 5, then on a best-estimate basis that operation produces negligible quantities of wastes requiring ultimate disposal. For example, extremely small volumes of methyl ethyl ketone are used on occasion; however, it commonly evaporates after use and, therefore, does not present a disposal problem in these instances. Conversely, if a particularly volatile compound is listed, then the quantity represents an estimate of the amount actually disposed of according to the method shown. Appendix H contains additional operations information in the form of a detailed list of base operations, their locations, and whether they generate hazardous wastes and/or used hazardous materials.

1. Aircraft Maintenance

a. Avionics Shop

The Avionics Shop is located in Building NG 155. This shop services and repairs electronic components of ANG aircraft. The main waste generated from this shop is waste fuel (10 gal/mo).

Table 4
Summary of Activities at Gowen Field Which Use Hazardous Materials.

Activity	Performing Organization
	IDAHO AIR NATIONAL GUARD
Aircraft Maintenance Ground Vehicle Maintenance	124th Consolidated Aircraft Maintenance Squadron
Photo-Processing and Interpreting	124th Tactical Reconnaissance Squadron
Fuels Management Facilities Maintenance Fire Protection Civil Engineering	124th Civil Engineering Flight
	IDAHO ARMY NATIONAL GUARD
Tracked Vehicle Maintenance	116th Maintenance Company
Helicopter Maintenance	116th Air Cavalry Troop
Civil Engineering	158th Engineering Detachment
	U.S. MARINE CORPS RESERVE
Tracked Vehicle Maintenance	Tank Company C

Table 5.
Shops Which Generate Hazardous Waste/Used Hazardous Materials.

Shop Name	Bldg. No.	Hazardous Waste/ Used Hazardous Material	Estimated Quantity	Method of Treatment/Storage/Disposal 1950——1960——1970——1980————Present
Avionics Shop	155	Waste Fuel	10 gal/mo	FIRE TR
Pneudraulic Shop	148	PD-680 Hydraulic Fluid	50 gal/mo 30 gal/mo	FIRE TR → DPDO
Battery Shop	148	NiCd Batteries	2 cells/yr	MFILL → DPDO
Tire Shop	153	PD-680 Paint Stripper	35 gal/mo 15 gal/mo	FIRE TR → DPDO
Propulsion Shop	1512	Turbine Oil Oily Wastewater	8 gal/mo <5 gal/mo	FIRE TR → DPDO OWS
Corrosion Control Shop	152	Methylethylketone Paint Thinner Paint Remover Paint Containers/ Filters/Rags	5 gal/mo 2.5 gal/mo 2 gal/mo 10 gal/mo	FIRE TR → DPDO MFILL
Corrosion Control Hanger	1518	Paint Containers/ Rags	5 gal/mo	MFILL

MFILL - Municipal trash removal service with disposal in municipal landfill
FIRE TR - Fire Dept. training exercises
DPDO - Defense Property Disposal Office, Mountain Home Air Force Base
OWS - Oil/Water separator; oil fraction removed by constractor
SS - Discharge to sanitary sewer
NEUTR - Neutralization and discharge to sanitary sewer
RECOVERY - Precious metal recovery with effluent discharged to sanitary sewer
DILUT - Dilution and discharge to sanitary sewer
GROUND - Dumped on ground
CNTRCT - Service contract for offbase disposal
RDOIL - Spread on roadways to suppress dust
USPFO - Salvaged as fuel for barracks through U.S. Property and Fiscal Office
- - - - Dashed time lines indicate suspected methods of treatment/storage/disposal
—— - Solid time lines indicate known methods of treatment/storage/disposal

TABLE 5. Shops Which Generate Hazardous Waste/Used Hazardous Materials (Continued)

Shop Name	Bldg. No.	Hazardous Waste/ Used Hazardous Material	Estimated Quantity	Method of Treatment/Storage/Disposal 1950———1960————1970— ——1980————————Present
Fuel Cell Maintenance Shop	1519	JP-4	200 gal/mo	- - - FIRE TR - - - - DPDO ———
		Methylethylketone	2 gal/yr	
		Paint Stripper	10 gal/mo	- - - - - MFILL - - - DPDO ———
		Oily Wastewater	< 5 gal/mo	- - - - - - - - - OWS - - ———
NDI	1509	Fixer	10 gal/mo	- - - SS - - - - - - - RECOVERY ———
		Developer	15 gal/mo	- - - - - - - DILUT - - ———
		Kerosene	1 gal/mo	- - - FIRE TR - - - - - DPDO ———
		Penetrant	2 gal/mo	
		Emulsifier	2 gal/mo	
		Waste Oil	2.5 gal/mo	
		Methylethylketone	1 gal/mo	
		Trichloroethane	1 gal/mo	
Support Equipment Shop	154	Motor Oil	6 gal/mo	- - - FIRE TR - - - - - - DPDO ———
		Turbine Oil	8 gal/mo	
		Hydraulic Fluid	4 gal/mo	
		Trichloroethane	5 gal/yr	
		PD-680	22 gal/mo	- - - - - - - - - - OWS - - ———
		*Battery Acid	2 gal/mo	- - SS - - - - - - - - - NEUTR ———
PPIF	146	Fixer	80 gal/mo	- - SS - - - - - - - RECOVERY ———
		Developer	60 gal/mo	- - - - - - DILUT - - - ———
POL	560	JP-4/AVGAS	50 gal/mo	- - - - - - FIRE TR - - ———
Transportation Motor Pool	551	Motor Oil	50 gal/mo	- - - FIRE TR - - - - DPDO ———
		Transmission Fluid	5 gal/mo	
		PD-680/Varsol/Gunk	55 gal/yr	- - - - - - - - - OWS - - ———
		JP-4	5 gal/mo	
Civil Engr. Carpenter Shop	504	Paint Thinner	10 gal/yr	- - GROUND - - - - - CNTRCT ———

* - This does not include acid from NiCd batteries.

TABLE 5. Shops Which Generate Hazardous Waste/Used Hazardous Materials (Continued)

Shop Name	Bldg. No.	Hazardous Waste/ Used Hazardous Material	Estimated Quantity	Method of Treatment/Storage/Disposal 1950—1960—1970—1980—Present
CSMS	561	*Battery Acid	35 gal/mo	SS → NEUTR
		Lubricating Oil	200 gal/mo	RDOIL → CNTRCT
		Calibrating Oil	40 gal/mo	RDOIL → CNTRCT
		Paint Thinner	60 gal/mo	RDOIL → CNTRCT
		Spray Paint	15 cans/mo	MFILL
		PD-680/Varsol/Gunk	< 5 gal/mo	OWS
		Diesel Fuel	<10 gal/mo	USPFO/OWS
OMS	555	Motor Oil	30 gal/mo	RDOIL → CNTRCT
		Brake Fluid	5 gal/mo	RDOIL → CNTRCT
		Antifreeze	15 gal/mo	RDOIL → CNTRCT
		*Battery Acid	10 gal/mo	SS → NEUTR
		Oily Wastewater	< 5 gal/mo	OWS
MATES	557	Motor Oil	100 gal/mo	RDOIL → CNTRCT
	558	*Battery Acid	10 gal/mo	SS → NEUTR
		PD-680/Varsol/Gunk	< 5 gal/mo	OWS
Army Aviation Support Facility	559	NiCd Batteries	3/yr	MFILL → DPDO
		Motor Oil	70 gal/mo	RDOIL → CNTRCT
		Hydraulic Fluid	16 gal/mo	RDOIL → CNTRCT
		JP-4	8 gal/mo	FIRE TR
DEH	506	Motor Oil	5 gal/mo	RDOIL → CNTRCT
Marine Corps Maintenance Shop	924	Motor Oil	25 gal/mo	RDOIL → CNTRCT

* - This does not include acid from NiCd batteries.

b. Pneudraulic Shop

The Pneudraulic Shop is located in Building NG 148. This shop maintains and repairs all aircraft pneumatic and hydraulic equipment. Wastes generated from this area include PD-680 (50 gal/mo) and hydraulic fluid (30 gal/mo).

c. Battery Shop

The Battery Shop is also located in Building NG 148. Approximately two nickel-cadmium batteries are disposed of each year as a result of battery maintenance operations.

d. Instrument Shop

The Instrument Shop, also located in Building NG 148, services and repairs all types of ANG aircraft instrumentation. Wastes generated by this activity are limited to spray solvent cans (4 cans/mo).

e. Tire Shop

The Tire Shop is located in Building NG 153. The tire repair and reclamation activities generate waste PD-680 (35 gal/mo) and paint stripper (15 gal/mo).

f. Propulsion Shop

The Propulsion Shop is located in Building NG 1512. Used for engine maintenance and testing, this shop generates waste turbine oil (8 gal/mo) and variable amounts of oily wastewater.

g. Corrosion Control Shop and Hangar

The Corrosion Control Shop and Hangar are located in Buildings NG 152 and NG 1518, respectively. Corrosion control activities include cleaning, sanding, stripping, priming, repainting, and stenciling aircraft and ground support equipment. Waste materials generated at the Corrosion Control Shop include methylethylketone (5 gal/mo), paint thinner (2.5 gal/mo), paint remover (2 gal/mo) and paint containers, filters and rags (10 gal/mo). Paint containers and rags (5 gal/mo) are the only hazardous wastes generated at the Corrosion Control Hangar.

h. Fuel Cell Maintenance Shop

The Fuel Cell Maintenance Shop is located in Building NG 1519. Wastes generated by this activity include JP-4 (200 gal/mo), methylethylketone (2 gal/yr), paint stripper (10 gal/mo) and variable amounts of oily wastewater.

i. Nondestructive Inspection (NDI) Laboratory

The NDI Laboratory is located in Building NG 1509. Nondestructive testing methods, including X-ray, magnaflux, and ultrasound, are performed to determine material defects of aircraft structures, component parts, and related ground equipment. Wastes generated in this shop include kerosene (1 gal/mo), fixers (10 gal/mo), developers (15 gal/mo), penetrants (2 gal/mo), emulsifiers (2 gal/mo), methylethylketone (1 gal/mo), trichloroethane (1 gal/mo) and waste oil (2.5 gal/mo).

2. Helicopter Maintenance

Helicopter service and repair activities are performed at the Army Aviation Support Facility located in Building NG 559. Maintenance activities at this ArNG shop generate waste JP-4 (8 gal/mo), motor oil (70 gal/mo), hydraulic fluid (16 gal/mo), spray solvent cans (5 cans/mo) and about three nickel-cadmium batteries annually.

3. Ground Vehicle Maintenance

Vehicle maintenance is performed in the Transportation Motor Pool (Building NG 551) and the Support Equipment Shop (Building NG 154). The Transportation Motor Pool services and repairs official vehicles and refuelers. Wastes generated at this shop include JP-4 (5 gal/mo), motor oil (50 gal/mo), transmission fluid (5 gal/mo) and PD-680/Varsol/Gunk degreasing compounds (55 gal/yr). The Support Equipment Shop is responsible for repair, maintenance, and periodic inspection of all aerospace ground equipment. Waste materials generated by this activity include motor oil (6 gal/mo), turbine oil (8 gal/mo), hydraulic fluid (4 gal/mo), battery acid (2 gal/mo), PD-680 (22 gal/mo), and trichloroethane (5 gal/yr).

4. Tracked Vehicle Maintenance

Service and repair activities for numerous tracked, armored vehicles are performed at the Combined Support Maintenance Shop (CSMS) (Building NG 561), the Mobilization and Training Equipment Site (MATES) (Building NG 557/558), and the Organizational Maintenance Shop (OMS) (Building NG 555). Along with these operations of the Idaho ARNG, tracked vehicle maintenance is performed at the U.S. Marine Corps Maintenance Shop (Building NG 924). Waste generated at the CSMS include battery acid (35 gal/mo), lube oil (200 gal/mo), calibrating oil (40 gal/mo), paint thinner (60 gal/mo), spray paint (15 cans/mo), and variable amounts of fuel- and solvent-contaminated wastewater. Activities at the OMS result in the generation of waste motor oil (30 gal/mo), antifreeze (15 gal/mo), battery acid (10 gal/mo), brake fluid (5 gal/mo), and variable amounts of oily wastewater. Wastes generated at the MATES include motor oil (100 gal/mo), battery acid (10 gal/mo), and variable amounts of solvent-contaminated wastewater. The Marine Corps Maintenance Shop generates approximately 25 gal/mo of waste motor oil.

5. Photo-Processing and Interpretation

The Photo-Processing and Interpretation Facility (PPIF) is located in Building NG 146. The PPIF is used for the development and preparation of tactical reconnaissance photos. Wastes generated at this facility include fixer (80 gal/mo) and developer (60 gal/mo).

6. Fuels Management

Fuels stored and dispensed at Gowen Field are JP-4 jet fuel, AVGAS, MOGAS, No.1 diesel fuel and No.2 fuel oil. JP-4 is stored in 1 420,000-gallon aboveground tank and 1 25,000-gallon aboveground tank (Buildings NG 5603 and 5602, respectively). AVGAS is stored aboveground in a 30,000-gallon tank (Building NG 5601). Liquid fuel pumping stations (Buildings NG 5605 and 5606) are located in the POL area.

MOGAS is stored underground at the Vehicle Filling Station (Building NG 507) in a 6,000-gallon tank. Appendix F contains an inventory of all fuel storage tanks in place at Gowen Field.

Remnants of a fuel storage and distribution system installed during WW II remain underground at Gowen Field today. Referred to as the aqua-system, this network was comprised of 16 25,000-gallon underground tanks with several feeder lines leading to dispensing stations on the ramp. The storage portion was located north of the current POL area in an area that is now a parking lot. This system, which employed water to displace the stored fuel, enabled rapid, direct refueling of B-17 and B-24 training aircraft. Along with other base operations, the aqua-system remained inactive for a brief period following WW II. After the Idaho ANG occupied Gowen Field, the storage portion of the system was used in conjunction with aircraft refueling vehicles while the underground feeder lines and ramp dispensers were abandoned. The aqua-system storage tanks were removed following the construction of the POL area in 1960. The underground feeder lines to the ramp have since been gradually removed as they were unearthed during base construction and improvement activities.

7. Civil Engineering

a. Water and Electrical Utilities

Drinking water supplies and wastewater collection and treatment services are furnished at Gowen Field by the City of Boise. Electric power is provided by Idaho Power Corporation. The Boise Water Corporation maintains three deeps wells within the boundaries of Gowen Field that, along with over a hundred other wells in the Greater Boise area, provide drinking water for the public distribution system. Similarly, all collected wastewaters are received and treated at municipal facilities. The base was formerly serviced by a sanitary wastewater treatment plant located beyond the western base boundary at the current site of a firewood distributor. Originally constructed around WW II, use of this facility was terminated in the mid-1960s and the plant was removed entirely in 1975.

The electrical distribution system, consisting of overhead transmission lines and transformers, is entirely owned and maintained by the Idaho Power Corporation. This utility has provided written assurance to Gowen Field that all transformers have been analyzed for PCB content and that none is present in any base electrical equipment.

b. Heating

The majority of structures at Gowen Field are heated with fuel oil, although some are heated with natural gas. The buildings each have separate heating plants, and those heated with oil each have an aboveground or belowground fuel supply tank. Under current development plans, structures will gradually be converted from oil to natural gas heating.

c. Pest Management

Pesticides are used infrequently at Gowen Field for nuisance control. Insecticides are applied only to the interior of buildings. Herbicides are used on runway ramps, around runway lights and security

fences, and in the clear zones at each end of the runways. No major spill of herbicides or insecticides was identified during interviews with base personnel. However, in the past herbicides and pesticides were heavily applied in the alert areas for security reasons.

d. Oil/Water Separators

There are a total of 17 oil/water separators or drainage sumps in use at Gowen Field. An inventory of the oil/water separators is provided in Appendix G. Most are of the sand-trap type, while others are baffled chambers. The drainage sumps collect oil or solvent wastes in holding tanks that are emptied periodically with no discharge of the water fraction. Water from the oil/water separator which services the tank wash area is discharged to drainage ditches while other oil/water seperators are drained into the sanitary sewer. The oil fraction is either drummed and disposed of through DPDO or removed by a private contractor. The three contractors currently performing this service at Gowen Field are the Boise Sewer Service, Rotorooter, and Crazy Bob's Oil Company.

8. Fire Department Training

Fire Department training activities have been conducted at two locations on Gowen Field since WW II. The first Fire Department training area to be used by the Idaho ANG operated from approximately 1953 until 1974. An average of 16 firefighting exercises were held each year using 50-100 gal of waste fuels, oil and solvents per fire. The total amount of wastes disposed of in this pit was estimated to be approximately 26,400 gal. Located due east of Taxiway M, the area has since been paved over for vehicle parking and a helicopter apron.

The current Fire Department training area is located east of Building NG 1515 immediately north of the central drainage ditch. It consists of a broad, circular depression surrounded by a sand-gravel berm. A large metal culvert has been placed in the pit to simulate an aircraft fuselage. The waste fuels are stored in a 9,600-gallon underground tank and, during

exercises, are pumped through a series of underground pipes to a sprinkler system in the center of the pit. The area is presently used by both the Idaho ANG and the firefighting crews of Boise Air Terminal. The site was first operated in 1974 and approximately 50 firefighting exercises have been conducted annually to date. From 1974 to 1979, approximately 15,000-20,000 gal/yr of waste fuel were used in the pit; however, since 1979, usage has increased to approximately 50,000-75,000 gal/yr for an equal number of exercises. Thus, an estimated 400,000 gallons of flammable waste have been disposed of in this pit to date.

9. Hazardous Waste Storage Accumulation Points

Several hazardous waste accumulation points are employed at Gowen Field to contain waste oils, solvents, contaminated fuels, and miscellaneous liquid wastes prior to disposal. The largest waste accumulation point is the underground waste fuel tank located at the current Fire Department training area. The smaller waste accumulation points are associated with the various ANG and ARNG industrial activities and generally consist of 55-gal drums set aside for liquid wastes. Solvent-contaminated wastes are disposed of through DPDO at Mountain Home Air Force Base, while waste oils are removed by Crazy Bob's Oil Company, a private contractor. The locations of the hazardous waste storage sites are given in Appendix H.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

The interviews with the 19 base personnel (Appendix C) and subsequent site surveys resulted in the identification of 13 past disposal/spill sites. Of these 13 sites, 6 have been determined to have the potential for contaminant migration (as determined in step 3 of Figure 1) and, therefore, have been further evaluated using the Air Force's Hazard Assessment Rating Methodology (HARM). Of the six rated sites, four represent hazardous materials disposal sites and two represent hazardous materials spill sites. The rated disposal sites at Gowen Field are the current Fire Department training area, the former Fire Department training area, a former fence post preserving operation, and a tar pit.

The rated spill sites at Gowen Field are the central drainage ditch and an oil patch in a drainage field. The locations of the rated sites at Gowen Field are illustrated in Figure 10. All sites were evaluated using the USAF HARM System (Appendix D).

A preliminary screening was performed on the 13 identified past disposal and spill sites based on the information obtained from the interviews and available records from the base and outside agencies. Using the decision tree process described in the Methodology Section of this report, a determination was made as to whether a potential exists for contaminant migration from these sites. Of the 13 identified sites, 6 were identified as having contaminant migration potential. The remaining 7 sites were considered not to have significant potential for contaminant migration and, therefore, were eliminated from further evaluation. The six sites with the potential for contaminant migration were then rated using the HARM system, which was developed for specific application to the Air Force Installation Restoration Program. The HARM system considers four aspects of the hazard posed by a specific site: the waste and its characteristics, the potential pathways for waste contaminant migration, the potential receptors of the contamination, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating. Copies of the completed rating forms are included in Appendix E. A summary of the overall hazard ratings for all rated sites is given in Table 6.

The 7 sites that were not rated were eliminated for reasons such as potential contamination being of a non-point source nature (i.e., pesticide application), exceptionally small volumes of associated hazardous waste, or the relatively non-hazardous nature of the spilled or disposed material. For such reasons, these sites are considered to pose little or no environmental threat, however, limited monitoring and sampling at some of these unrated sites will be recommended (see RECOMMENDATIONS chapter of this document). The locations and descriptions of the 7 unrated sites are discussed under subsection 3, "Miscellaneous Unrated Sites," in this chapter.

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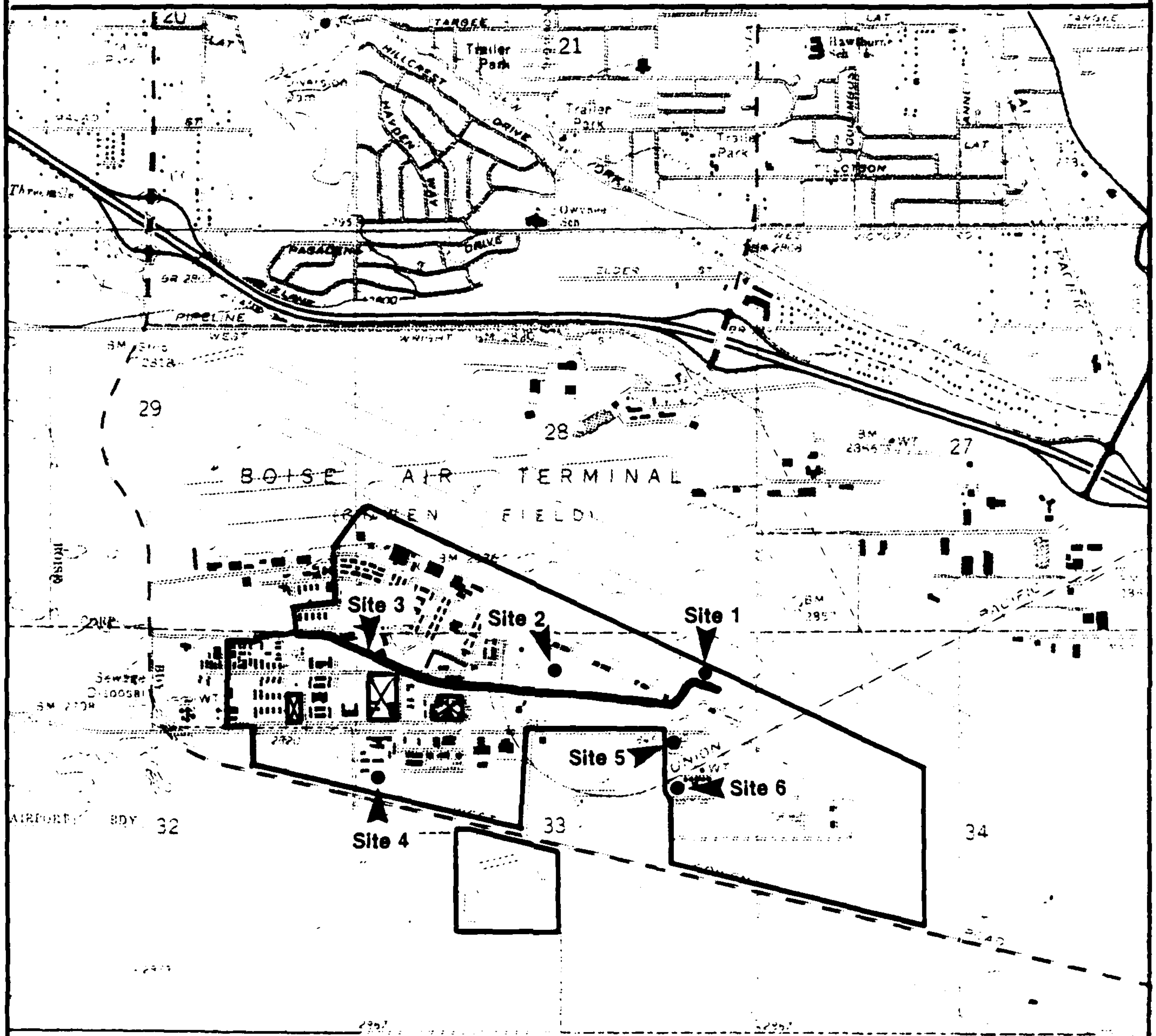
Figure 10.
Location of the Rated Waste Disposal and Spill Site at Gowen Field.



Legend

Site 1: Current Fire Department Training Area

Site 2: Former Fire Department Training Area

Site 3: Central Drainage Ditch

Site 4: Oil Patch in Drainage Field

Site 5: Former Wood Preserving Operation

Site 6: Tar Pit

N

Scale in Feet

1000 0 1000 2000 3000

Source: U.S.G.S.

Table 6.
Summary of the Results of the Site Ratings.

Priority	Site No.	Site Description	Subscores: Receptors	Subscores: Waste Characteristics	Subscores: Pathway	Subscores: Waste Mgmt. Practices	Overall Score
1	1	Current Fire Dept. Training Area	52	100	67	0.95	69
2	2	Former Fire Dept. Training Area	52	100	52	0.95	56
3	3	Central Drainage Ditch	52	48	67	1.00	56
4	4	Oil Patch in Drainage Field	50	40	67	1.00	52
5	5	Former Fence Post Preserving Operation	50	40	49	1.00	46
6	6	Tar Pit	50	30	49	1.00	43

The unrated sites are (1) four areas of herbicide application, (2) an abandoned drum disposal site, (3) a buried fuel tank, and (4) minor tar patches in the vicinity of the rated tar pit.

Below are descriptions of each rated site, including a brief description of the rating results. For each site, the factors that most significantly influenced its HARM score are discussed. For all sites, certain factors were common that contributed to all scores. These factors are not repeated below, but include the nearby residentially zoned land, use of the uppermost aquifer for drinking water, comparatively elevated precipitation amounts and intensities, and direct access of contaminants to the groundwater via the highly permeable soils and subsoils.

1. Rated Disposal Sites

a. Site No. 1: Current Fire Department Training Area (HARM Score: 69)

This site is identif ed as Site No. 1 in Figure 10 and is located between Taxiway K and the central drainage ditch approximately 200 feet northeast of Building NG 1515. The receptors, waste characteristics, pathways, and waste management subscores for this site are 52, 100, 67, and 0.95, respectively. The waste characteristics subscore received the maximum value because of the large amount of high-hazard material known to have been disposed of at the pit. Another significant factor related to the scoring of this site is its close proximity to two on-site wells of the Boise Water Corporation, both of which are used for drinking water. The pathways subscore is influenced by the proximity of the site to the drainage ditch and the potential for occasional flooding of the site.

The history of this site was previously discussed in Section IV A (8) of this report. This historical review indicates that a total of approximately 400,000 gallons of liquid waste was placed into the burn pit from 1974 to the present. Of this total, approximately 75 percent was waste fuel, 20 percent was waste oil, and five percent were mineral spirits and halogenated solvents.

The firefighting agents used in this pit include aqueous film forming foam (AFFF), and bromochloromethane. Of the total of 400,000 gallons of liquid waste placed in the pit, 80 percent (320,000 gallons) is assumed to have been consumed by fire.

Today, the firefighting training pit measures in excess of 100 feet in diameter and is surrounded by a sand-gravel dike. Evidence of soil discoloration and odor beyond the pit was only observed around the inlets to the waste holding tanks and the adjacent waste pumping station. No vegetative stress or visible hydrocarbon contamination was evident in the adjacent portion of the central drainage ditch.

b. Site No. 2: Former Fire Department Training Area (HARM Score: 56)

This site is identified as Site No. 2 in Figure 10 and is located adjacent to Taxiway M approximately 450 feet east of the current POL area (Building NG 560). The receptors, waste characteristics, pathways, and waste management subscores for this site are 52, 100, 52, and 0.95, respectively. Essentially the same factors influencing the subscores of Site No. 1 are significant at this site, including proximity to drainage and water wells. The waste characteristics subscore received the maximum value because of the large amount of wastes deposited at this site.

The historical review presented in Section IV A (8) indicated that a total of approximately 26,400 gallons of liquid waste was placed into the burn pit from 1953 to 1974. Again, the waste was primarily fuel and waste oil along with small amounts of solvents. Of the total of 26,400 gallon of liquid waste placed in the pit, 80 percent (21,120 gallons) is assumed to have been consumed during firefighting training exercises. No visible trace of the site remains as it was filled, graded and paved over in 1974.

c. Site No. 5: Former Fence Post Preserving Operation (HARM Score: 46)

This site is identified as Site No. 5 in Figure 10 and is located in a field across an unnamed road from the Western Steel Manufacturing Company. The receptors, waste characteristics, pathways, and waste management subscores for this site are 50, 40, 49, and 1.00, respectively. Significant factors related to its scoring include its proximity to water wells and the base boundary, and the hazardous and persistent nature of a potential constituent (pentachlorophenol) of the waste.

This site was discovered during the ground tour of the base and consists of a patch of discolored, scaly earth measuring approximately 200 square feet. Three opened 55-gallon drums are buried to the rim in the central portion of the patch. These drums contain varying amounts of a dark sludge resulting from the former treatment of fenceposts with a creosote preparation. The duration of fence post treatment operations at this site is unknown, as is the approximate date of abandonment. Vegetative growth remains absent from the visibly contaminated patch while vegetative stunting is evident around the periphery. A distinct creosote odor in air is apparent immediately adjacent to the drums. Erosion appears to have had minimal effect on this site and any runoff from the mounded area would be dispersed in all directions away from the site.

d. Site No. 6: - Tar Pit (HARM Score: 43)

This site is identified as Site No. 6 in Figure 10 and is located immediately south of the abandoned railway spur at the former site of an asphalt distribution company. The receptors, waste characteristics, pathways, and waste management subscores for this site are 50, 30, 49, and 1.00, respectively. The scoring of this site is primarily influenced by the large volume of waste material deposited in the pit and its proximity to the base boundary. The semi-solid physical state of the waste is also a significant scoring factor at this site.

The former asphalt company is reported to have operated from shortly after WW II until approximately 1977. During that period, waste asphalt products were accumulated in an open pit that now measures approximately 100 by 200 feet with an estimated depth of 8 to 10 feet.

3. Miscellaneous Unrated Disposal Sites

As previously indicated, there are seven disposal sites which were not rated because the potential for contaminant migration from these sites was considered to be very low or nonexistent. A ground tour of the base and interviews with past and present personnel did not lead to the identification of any further spill sites. Brief descriptions of the unrated disposal sites follow.

a. Herbicide Application Sites (Unrated)

There are four sites at Gowen Field where intensive applications of atrazine, simazine and/or tebuthiuron were made to control plant growth around structures. These herbicide applications were made in restricted areas surrounding structures and at a distance outside perimeter fencing at the following locations: (1) the alert barns (Buildings NG 1516-1521), (2) the rocket storage shed (Building NG 1510), (3) the missile storage area (Buildings NG 1522-1524), and (4) the POL area (Buildings NG 5601-5605).

The use of these herbicides was instituted for a period lasting approximately from the late 1950s to the early 1970s. The practice was undertaken coincident with the 24-hour alert fighter interception mission of Gowen Field and resulted from security requirements to control vegetative growth around the alert structures. An average application of the sterilants was reported to remain active for up to seven years although applications were often made at more frequent intervals, e.g., prior to inspections to eradicate any visible weeds. The decision not to rate this site was based on the fact that these high-strength herbicides were applied over a decade ago, the non-point applications do not constitute a disposal activity, and the residues have undergone considerable degradation and dispersal over the past decade.

b. Abandoned Drum Disposal Site (Unrated)

A ground inspection of the base led to the discovery of a small rubble pile containing 10 to 15 abandoned 55-gallon drums. This site is located in a field due south of the alert barns and immediately south of the abandoned railway spur. The ground inspection revealed that most of the drums were empty, although at least one was filled and sealed while another contained a black, flaky solid mass. This site was not rated because the contents of the two full drums could not be confirmed to be of a hazardous nature. Also, the drums were deposited on the surface of the ground and no visible contamination or vegetative stress could be observed.

c. Abandoned Underground Fuel Tank (Unrated)

The ground inspection also revealed the presence of two standpipes to an underground tank as well as partially buried electrical cords. Located at the site of the former asphalt company, these materials appear to be remnants of a former fuel tank and pump for commercial vehicles. A strong hydrocarbon odor, resembling gasoline more than fuel oil, was detected upon removal of the cap from the inlet standpipe. This site was not rated because the nature and quantity of wastes, and the structural integrity of the tank, could not be determined.

d. Tar Patches (Unrated)

Numerous small tar patches were observed on the surface of the ground at the site of the former asphalt company. These small patches were of minimal thickness and appeared to be largely solidified or consolidated with sand and gravel. These patches were not rated due to their minimal extent, the low level of hazard of the waste material, and the absence of visible evidence of contaminant migration.

V. CONCLUSIONS

- Information obtained through interviews with 19 past and present base personnel, review of base records, and field observations have resulted in the identification of a total of 13 past disposal and/or spill sites at Gowen Field.

- Of these 13 sites, 6 have been further evaluated using the Air Force's Hazard Assessment Rating Methodology. Seven of the original 13 sites were not evaluated using the HARM system because it is thought that they exhibited no potential for contaminant migration and; therefore, pose no significant hazards to health and welfare. A priority listing of these waste disposal and spill sites and their associated hazard assessment scores has been presented in Table 6. Site Nos. 4 (Oil Patch in Drainage Field) and 5 (Forr . Wood Preserving Operation) presently exhibit varying degrees of environmental stress. No other sites exhibit visible environmental stress.

- No direct or indirect evidence of groundwater contamination was discovered. However, the overall groundwater environment at Gowen Field is susceptible to contamination from surface contaminants. Factors contributing to this susceptibility are the presence of fractures within the hardpan which allow downward migration of fluids, although, at a slower rate than would otherwise occur if the hardpan were not present. These fractures allow for an influence of percolating surface water on water levels in the shallow aquifer.

- No evidence of off-base environmental stress resulting from past disposal of waste materials was observed in the immediate vicinity of Gowen Field. However, the close proximity of all sites to the base boundaries increases the likelihood of off-base contaminant migration via the groundwater pathway. Fortunately, the direction of groundwater flow is to the south of the base toward the open desert and away from populated portions of the Greater Boise area.

VI. RECOMMENDATIONS

The potential for contaminant migration at Gowen Field is moderately high; therefore, it is recommended that Phase II monitoring be conducted. This monitoring should consist of analysis of soil and groundwater samples for selected organic and inorganic parameters. The primary purposes for monitoring each of the proposed locations are to:

- Determine the depth within the unsaturated zone to which contaminants have migrated. If only the shallow subsurface has been contaminated at a particular site, it may be possible to remedy the problem by excavating the contaminated material, if concentration levels warrant excavation.

- Determine whether groundwater at each monitoring site has been contaminated.

- Determine the extent of contamination and the rate and direction of contaminant migration, if groundwater contamination is observed.

A. Locations to be Monitored

All of the rated sites are recommended for monitoring. These sites have been grouped into monitoring areas on the basis of their proximity to each other. Figure 11 illustrates the three general areas at Gowen Field that are recommended for monitoring, and the locations of the spill/disposal sites within these areas. Two of the proposed monitoring areas encompass more than one spill/disposal site due to the close proximity of the sites. The first monitoring area encompasses the two Fire Department training areas (Sites No. 1 and 2) and the central drainage ditch (Site No. 3). The second monitoring area encompasses the former wood preserving operation and the tar pit (Sites No. 5 and 6). The third monitoring area encompasses the oil patch in the drain field (Site No. 4).

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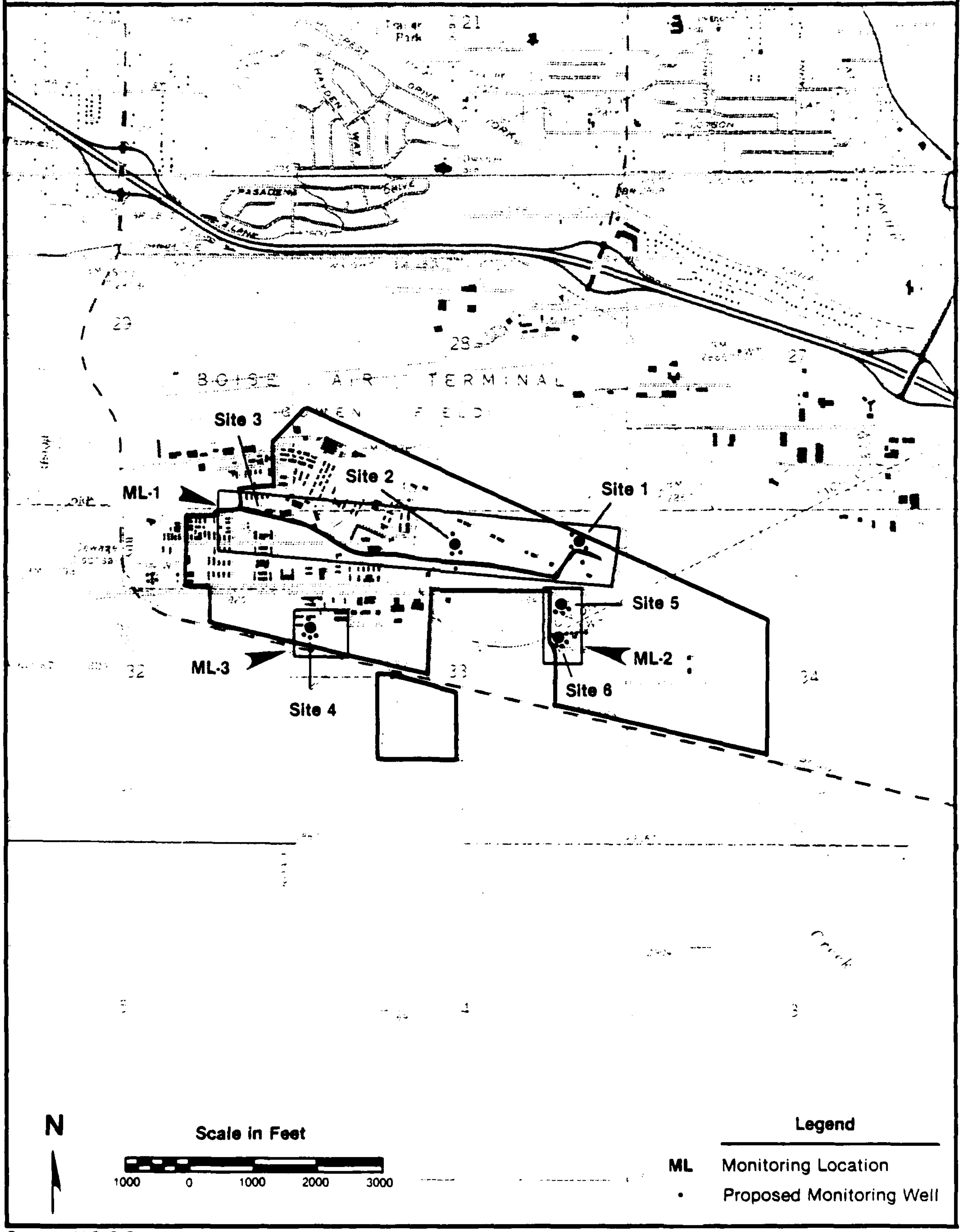
Figure 11.
Locations of the Proposed Areas at Gowen Field to be Investigated During Phase II of the IR Program.



Source: U.S.G.S.

Table 7 summarizes the monitoring locations within which all of the above spill/disposal sites are located.

B. Site-specific Recommendations for the Monitoring Locations

While reading the following site-specific recommendations, the reader should refer to Figure 12, the illustrated enlargements of each of the proposed sites to be monitored. Additionally, where analysis of soil samples is recommended, these soil samples should be collected from the surface and at depth intervals thereafter of no greater than 2 feet to a depth of 10 feet below the limits of visible contamination.

Monitoring Location No. 1 (Fire Department Training Areas and the Central Drainge Ditch)

At both the current and former Fire Department training areas, one up-gradient monitoring well and three down-gradient monitoring wells are recommended at the approximate locations illustrated in Figure 11. These wells are intended to facilitate monitoring of the quality of the shallow groundwater system and to enable better determination of the flow directions for this groundwater system at these sites. Groundwater samples from each of these eight wells should be analyzed for the parameters summarized in Table 8a.

During the installation of these wells, small amounts of perched groundwater may be encountered prior to reaching the regional, shallow groundwater system located at a depth of approximately 100 feet. Perched groundwater samples should also be analyzed for the parameters in Table 8A. Additionally, soil samples from each of the training areas should be analyzed for the parameters summarized in Table 8b. The results from the groundwater analyses and soil analyses should be compared in order to assess the extent to which the Fire Department training areas are the source for any observed groundwater contamination. Any discrepancies between these results may indicate that the Fire Department training areas are not the sources of observed groundwater contamination; however, this situation is not anticipated.

Table 7.
Summary of the Spill/Disposal Sites Recommended for Phase II Investigation, and the Monitoring Location Within Which Each is Located.

Site	Description	Monitoring Location
Site 1	Current Fire Dept. Training Area	ML-1
Site 2	Former Fire Dept. Training Area	ML-1
Site 3	Central Drainage Ditch	ML-1
Site 4	Oil Patch in Drainage Field	ML-3
Site 5	Former Fence Post Preserving Operation	ML-2
Site 6	Tar Pit	ML-2

Figure 12.
Locations of the Proposed Groundwater Monitoring Wells Within the Proposed Areas to be Investigated at Gowen Field.

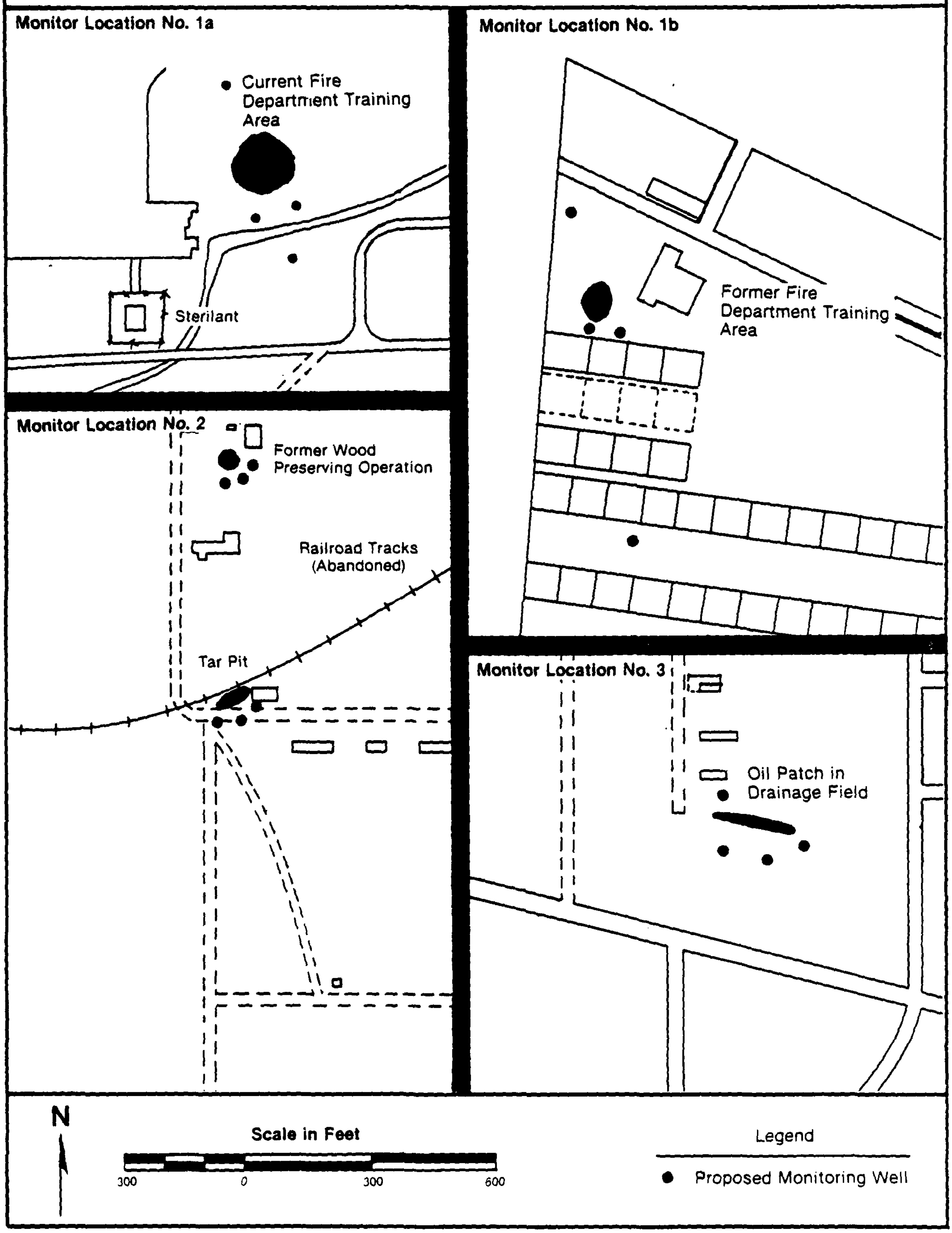


Table 8a.
Recommended Parameters For Which Groundwater Samples Should be Analyzed.

WATER
Total Organic Carbon
Total Organic Halogens
pH
Specific Conductivity
Oil and Grease
Phenols (Site No. 5, only)
Screen for Volatile Organics (EPA Method 624)

Table 8b.
Recommended Parameters For Which Soil Samples Should be Analyzed.

SOIL
Oil and Grease
Phenols
GC/MS Screen for Priority Organic Pollutants

No groundwater monitoring wells are recommended for the central drainage ditch. This is because the probability is high that, if groundwater is contaminated as a result of the drainage ditch, this contamination will have been detected by the down-gradient monitoring wells associated with the two Fire Department training areas. It is recommended, however, that three sets of soil samples (each set consisting of three samples) be collected from within the drainage ditch and that each of these samples be analyzed for the parameters in Table 8b. The first two sets should be collected from the segments of the central drainage ditch which are, respectively, immediately down-gradient of the current and former Fire Department training areas. The third set should be collected from the western end of the drainage ditch immediately prior to where the ditch exits the property of Gowen Field.

Analytical results from the drainage ditch soil samples should be compared to those of the Fire Department training areas to determine if these areas are the likely sources for any observed contamination.

Monitoring Location No. 2 (Fence Post Preserving Operation and the Tar Pit)

Because both of these sites are located down-gradient of the central drainage ditch and the current Fire Department training area, it is recommended that no up-gradient wells be installed at either of these sites for the purpose of determining background groundwater quality. For each site; however, three down-gradient wells are recommended. Groundwater samples from these wells should be analyzed for the parameters listed in Table 8a. Soil samples from each of these sites should be analyzed for the parameters in Table 8b. Additionally, soil samples and groundwater samples from site 5 (former fence post preserving operation) should be analyzed for creosote and pentachlorophenol, which are likely components of common wood preservative formulations.

As with monitoring location No. 1, groundwater samples should be collected from any perched groundwater systems that are encountered, as well as from the shallow, regional groundwater system which is thought to occur at a depth of approximately 100 feet at this location.

Monitoring Location No. 3 (Oil Patch in Drain Field)

At site No. 4, one up-gradient monitoring well and three down-gradient monitoring wells should be installed into the shallow regional aquifer. Water samples from these wells should be analyzed for the parameters identified in Table 8a. Also, soil samples from the area of visible contamination should be analyzed for the parameters in Table 8b.

C. Miscellaneous Recommendations

Abandoned Drum Disposal Site

It is recommended that the abandoned drums and refuse located at this unrated site be removed following any sampling necessary to determine the contents of full or partially full drums. Upon completion of site cleanup, five shallow subsurface soil samples should be taken from the area beneath the drum pile and analyzed for the parameters listed in Table 8b. Additionally, if the results of the first set of soil samples are positive, further soil sampling and analysis should be conducted to determine changes in contaminant concentration with soil depth.

Abandoned Underground Tank

The abandoned fuel tank, located at the site of the former asphalt distribution company and previously operated by them, should be sampled to determine the contents. Five shallow subsurface soil samples should be collected from the area immediately around the tank emplacement and analyzed for the parameters listed in Table 8b. As recommended above, further soil sampling and analysis should be conducted if initial results are positive, and if necessary, the tank should be emptied and removed..

Regional Up-gradient Well

A single up-gradient well that is far removed from all known sources of contamination is recommended. This well is recommended in order to assure that background groundwater quality can be determined, without any interference from previous activities at the base. If possible, this well should be located as far north of the industrial areas of the base as possible.

The purpose of this well is to provide reliable and alternative background groundwater quality data in the event that the previously recommended up-gradient monitoring wells at the individual monitoring locations are impacted by unanticipated groundwater contamination up-gradient from them. Such interference with the up-gradient wells is unlikely, but is possible due to the high level of historic operations activity throughout the area of the monitoring locations. The wells should be sampled and analyzed for the parameters listed in Table 8a.

Base Drinking Water Wells

Because of the overall hazard related to groundwater contamination, all existing wells at Gowen Field which are used for drinking water should be sampled and analyzed for the parameters listed in Table 8a.

Table 9 summarizes the Phase II recommendations for Gowen Field.

Table 9.
Summary of Phase II IR Program Recommendations.

	Site Name	HARM Score	Recommended Monitoring
1.	Current Fire Dept. Training Area	69	Install 3 down-gradient wells and one up-gradient well. Analyze water samples for the parameters in Table 8a. Analyze soil samples for the parameters in Table 8b. Install one of the three down-gradient wells across the drainage ditch from this site as shown in Figure 11.
2.	Former Fire Dept. Training Area	63	Install 3 down-gradient wells and one up-gradient well. Analyze water samples for the parameters in Table 8a. Analyze soil samples for the parameters in Table 8b. Install one of the three down-gradient wells across the drainage ditch from this site as shown in Figure 11.
3.	Central Drainage Ditch	56	Collect 3 sets of 3 sediment samples from the specified segments of the drainage ditch. Analyze sediment samples for the parameters in Table 8b.
4.	Oil Patch in Drain Field	52	Install 3 down-gradient wells and one up-gradient well. Analyze water samples for the parameters in Table 8a. Analyze soil samples for the parameters in Table 8b.
5.	Former Fence Post Preserving Operation	50	Install 3 down-gradient wells and analyze water samples for the parameters in Table 8a. Analyze soil samples for the parameters in Table 8b. Also analyze groundwater and soil samples for phenols.
6.	Tar Pit	47	Install 3 down-gradient wells and analyze water samples for the parameters in Table 8a. Analyze soil samples for the parameters in Table 8b. Also analyze groundwater and soil samples for phenols.
<u>Miscellaneous Unrated Sites</u>			
a.)	Abandoned Drum Disposal Site	Unrated	Following site cleanup, collect 5 shallow subsurface soil samples and analyze for the parameters in Table 8b. If initial samples are positive, collect and analyze soil samples from various depths.
b.)	Abandoned Underground Tank	Unrated	Collect 5 shallow subsurface soil samples and analyze for the parameters in Table 8b. If initial samples are positive, collect and analyze soil samples from various depths, and, if necessary remove tank.

D. General Monitoring-Well Construction Criteria

Selection of appropriate monitoring-well designs is the responsibility of the contractor for the Confirmation/Quantification Phase of the IR Program. Designs selected by the contractor should facilitate determination of vertical variations in parameters such as aquifer permeability, pressure head, and contaminant concentrations. Whether such data are acquired using, for example, nested piezometers or fully screened wells fitted with packers, is at the discretion of the contractor. Such information is important for determining the three-dimensional orientation and movement of the contaminant plume and for designing Phase III Remedial Actions.

At a minimum, the well construction protocol should include:

- Tremie grouting of the annular space for each well to a depth of 5 feet below ground surface.
- Recording of detailed well logs which include daily static water levels, type of geologic materials encountered, depths to water-producing zones, and samples of cuttings from each well that are collected from 5-foot intervals.
- Proper identification and surveying of all wells.

E. Sampling Criteria

Groundwater from each screened interval for all wells should be collected and analyzed for volatile organic carbon species, oil and grease, total organic halogens, phenols, and heavy metals. The sampling protocol for all monitoring wells should include:

- Removal of a volume of water equal to at least three times the volume of the well below the saturated zone, prior to water sample collection.
- Use of stainless steel/teflon bailers and/or pumps for withdrawal of water.

- Acidification of samples to be analyzed for total metals.
- Use of glass containers for samples to be analyzed for oil and grease.
- Immediate refrigeration and transporting of the samples to the analytical laboratory subsequent to sample collection.
- Appropriate chain-of-custody records.

All groundwater quality data should be statistically analyzed by methods approved by the U.S. Environmental Protection Agency and the Idaho Department of Water Resources in order to illustrate significant differences in groundwater quality.

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT

AFB	Air Force Base
AFFF	Aqueous Film Forming Foam
ANG	Air National Guard
ANGSC	Air National Guard Support Center
ARNG	Army National Guard
AVGAS	Aviation Gasoline
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSMS	Combined Support Maintenance Shop
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DLA	Defense Logistics Agency
DOD	Department of Defense
DPDO	Defense Property Disposal Office
EPA	Environmental Protection Agency
°F	Degrees Fahrenheit
gal/mo	gallons per month
gal/yr	gallons per year
GC/MS	Gas Chromatography/Mass Spectroscopy
HARM	Hazard Assessment Rating Methodology
HMTC	Hazardous Materials Technical Center
IRP	Installation Restoration Program
JP	Jet Petroleum
MATES	Mobilization and Training Equipment Site

MOGAS	Motor Gasoline
MSL	Mean Sea Level
NDI	Nondestructive Inspection
NG	National Guard
No.	Number
OMS	Organizational Maintenance Shop
OWS	Oil/Water Separator
PCB	Polychlorinated Biphenyl
PD	Petroleum Distillate
POL	Petroleum, Oils, and Lubricants
PPIF	Photo-Processing and Interpretation Facility
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
USAF	United States Air Force
USMC	United States Marine Corps
WPA	Works Progress Administration
WW	World War

GLOSSARY OF TERMS

1. ALLUVIUM - A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semisorted sediment in the bed of the stream or on its flood plain or delta.

2. AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

3. CONFINING STRATA - A strata of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

4. CONTAMINANT - As defined by section 104(a)(2) of CERCLA, shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformation, in such organisms or their offspring.

5. DISCHARGE - The process involved in the draining or seepage of water out of a groundwater aquifer.

6. DOWNGRADIENT - A direction that is hydraulically downslope; the direction in which groundwater flows.

7. EVAPOTRANSPIRATION - Evaporation of water from the ground surface and transpiration through vegetation.

8. HARDPAN - A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substances.

9. HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

   (a) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or

   (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed.

10. MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

11. PCB (Polychlorinated Biphenyl) - A chemically and thermally stable toxic organic compound. Characteristically, it persists for long periods of time, is not readily biodegradable, and is biologically accumulative.

12. PD-680 - A petroleum distillate used as a safety cleaning solvent. Two types of PD-680 solvent have been used: Type I, having a flash point of 100° F; and Type II, having a flashpoint of 140° F.

13. PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

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APPENDIX A.

OUTSIDE AGENCY CONTACT LIST

OUTSIDE AGENCY CONTACT LIST

1. United States Geological Survey
   Water Resources Division
   Boise, Idaho
   Dick Whitehead (Hydrogeologist)
   (208) 334-1702

2. Boise Water Coporation
   Boise, Idaho
   Clint Long
   (208) 362-1300

3. Department of Public Works
   Mapping Division
   Boise, Idaho
   Bill Colson
   (208) 384-4292

4. Department of Water Resources
   Public and Domestic Wells Section
   Boise, Idaho
   John Noise (Geologist)
   (208) 334-4440

5. Department of Planning and Zoning
   Central Mapping Division
   County Building
   Boise, Idaho
   (208) 383-4425

6. Fish and Game Commission
   Bureau of Wildlife
   Mortel Morache (Naturalist)
   (208) 334-2920

7. Aqua Masters Well Drilling Co.
   Boise, Idaho
   Kent Bunn (Owner)
   (208) 376-6736

APPENDIX B.

RESUMES OF SEARCH TEAM MEMBERS

RESUMES OF SEARCH TEAM MEMBERS

DONATO R. TELESCA

Senior Chemical Engineer

EDUCATION

B.S., chemical engineering, Massachusetts Institute of Technology
B.S., business administration, Rutgers University

EXPERIENCE

Mr. Telesca has thirty-six years of experience in process engineering, pollution control engineering, and solid waste and wastewater management. He directed or was principle investigator in projects to identify and evaluate process design, alternative processing systems, characterization of waste streams, product intermediates and uses, and disposal options. He is widely experienced in the operation and management of pilot plant units and manufacturing facilities.

As a senior Chemical Engineer in the chemical industry, he designed instrumentation and changes in plant processes to reduce contamination of waste streams with hazardous materials and developed process changes to reduce pH, COD, BOD, solids, and total volume. He invented a new production process and instituted new procedures required for the collection and proper disposal of chlorinated rubber and chlorinated off-grade product, carbon tetrachloride, rubber waste, and hydrochloric acid waste. He developed procedures for the collection and disposal of hazardous wastes resulting from the manufacture of pilot plant lot sizes of sodium carboxymethyl cellulose, plasticizers, and other organic based products. He also supervised the operations for disposal of hazardous waste materials from the nitric acid manufacturing unit, sulfuric acid concentrators, nitrocellulose manufacturing and packaging facilities, alcohol distillation unit and cellulose acetate manufacturing facilities.

As manager of Process Development for W.R. Grace and Company, Mr. Telesca evaluated the regulatory compliance of W.R. Grace Nuclear Reprocessing plant in New York for hazardous waste disposal methods. Where such methods were unsatisfactory, he designed improvements for removal of contaminated filters in a high radioactivity area, redesigned collection system for hazardous wastewater, and designed procedures for burying the radioactive liquids and solid wastes received from outside the plant. He sampled New York State waters and collected soil samples from surrounding farms to determine the extent of contamination by hazardous materials.

Also as Manager, Mr. Telesca designed standard operating procedures for polycrystalline silicon production, including control technology for hazardous gaseous, liquid and waste emissions. He designed, reviewed and implemented the procedures for disposal of hazardous wastes which include a chlorinated hydrocarbon, hydrochloric acid, sodium hydroxide and by-products from the manufacturing process. He evaluated existing procedures and recommended changes in the collection and disposal of hazardous solids and liquids including heavy metals, acids, bases, and organomentals.

At Dynamac, Mr. Telesca has directed on-site industry studies to assess hazardous pollution control systems for reducing inorganic mercury in waste streams and studied several industries to develop generic pollutant standards for industries using similar processes (e.g., hydrocarbon chlorination). He also investigated industrial process and chemical waste generation for several EPA projects, identifying processes for chemical production, production yields and facility capacity, points of effluent discharge, manufacturers, types and amounts of waste generated, and exposure potential. For same studies engineering controls were recommended. He has characterized waste water industrial discharges in a study of 343 industries. Chemical and physical data were used to establish pollutant impact, and the need for engineering controls, waste water stabilization ponds, on-site treatment systems, and land disposal systems. He has studied hazardous solid waste generation and disposal for the pulp and paper, plastics and resins, acrylic fibre and rubber industries. Mr. Telesca also studied process redesign and engineering controls for several DOD fabrication and maintenance operations including degreasing, electroplating, paint still bottoms and sludges. Engineering controls included materials recovery for reuse or resale, neutralization and detoxification.

Presently, Mr. Telesca is Manager of the Remedial Action and Treatment Department of the Hazardous Materials Technical Center. He is Program Manager for: two hazardous waste management site cleanup projects involving ambient air monitoring, costing, locating buried drums, landfill excavation, well drilling, and groundwater monitoring; feasibility study involving sulfide precipitation of heavy metals; cleanup of thirty-three sites with asbestos; groundwater assessment of waste ash pile; removal of waste salts at Army arsenals; removal of tanks which had contained PCB-contaminated solvents, acids and solvents; removal of military ash pile; installation restoration program; thermal destruction of low level waste; and feasibility studies concerning plating solutions and clean-up of JP4 spills.

PROFESIONAL AFFILIATIONS

American Institute of Chemical Engineers

TORSTEN ROTHMAN

Senior Environmental Engineer

EDUCATION

M.S., environmental health engineering, University of Texas
B.Ch.E., Rensselaer Polytechnic Institute

EXPERIENCE

Mr. Rothman has 25 years of experience in all aspects of environmental health engineering, hazardous wastes and solid wastes management, environmental impact analysis, wastewater treatment, and air pollution evaluation and control. This includes 20 years as an Air Force bioenvironmental engineer with service at base level, major command, research and consulting laboratories, and USAF headquarters. He has in-depth knowledge and understanding of Air Force operations, organization, and occupational safety and health programs.

Mr. Rothman managed the implementation of the National Environmental Policy Act for the U.S. Air Force, and directed and managed the preparation and filing of over 15 Environmental Impact Statements. The subjects of these impact statements covered a broad spectrum of biophysical and socioeconomic issues. Mr. Rothman was responsible for technical adequacy, accuracy and completeness, as well as for procedural compliance of all documents. He also served on the staff of the Air Force Surgeon General as an advisor on all aspects of environmental health engineering, and directed the development of Air Force policy for compliance with Federal regulations in areas of wastewater, solid waste, air pollution, and drinking water.

Mr. Rothman's bioenvironmental engineering experience includes the provision of a full range of occupational and environmental health services to various Air Force installations. These services include conducting numerous industrial hygiene, medical and industrial ionizing radiation, wastewater, and environmental protection studies; and membership in a Disaster Response Force responsible for medical surveillance of nuclear, biological and chemical decontamination procedures, and personnel protection and monitoring.

Mr. Rothman's municipal wastewater experience includes in-depth studies on trickling filter and activated sludge municipal wastewater treatment plants. Most of these studies were performed while he was a consultant to the Pacific-area Air Force Installations regarding all aspects of environmental health engineering. Related studies include research on solid waste management practices, and combustion products of plastics commonly found in municipal refuse.

Presently Mr. Rothman serves as Director of the Hazardous Materials Technical Center, a center of expertise for information on all aspects of hazardous materials/hazardous wastes management including safety and health, transportation, storage, handling, and disposal. The types of projects that Mr. Rotnman routinely manages include those involved with environmental engineering, hazardous waste management, sanitary engineering and waste treatment.

CERTIFICATION

Diplomate, American Academy of Environmental Engineers
Professional Engineer (environmental health), Texas

HONORS

Sigma Xi, Research Society of America
Chi Epsilon, Civil Engineering Honorary Society
Phi Kappa Phi, Scholastic Honorary Society
Registry of International Consultants, Ameri_an Public Health Association
Member Emeritus of American Conference of Governmental Industrial Hygienists

WILLIAM EATON

Hydrogeologist

EDUCATION

M.S., environmental sciences, University of Virginia
B.A., geology, Susquehanna University

EXPERIENCE

Mr. Eaton's primary experience is in the areas of geologic and groundwater investigation of sites that were contaminated by hazardous or toxic organic and inorganic chemical substances. These investigations have included emergency response to ruptured surface petroleum storage tanks and subsurface pipelines. In such instances, Mr. Eaton directed onsite remedial actions including the proper location and installation of subsurface containment barriers, and nested piezometers designed to sample various confined aquifers. Similar studies involved the investigation of hazardous waste dump sites, and the development of contract design specifications for excavation of the buried waste and sealing of the contaminated area.

Investigation of nonpoint sources of chemical contamination have also been conducted by Mr. Eaton. Typically, these studies have involved implementation of a regional scale physical and chemical groundwater monitoring scheme, and subsequent analysis of the data to pinpoint the probable sources of contamination and contaminant migration directions and rates. Where applicable, consultations were held with the interested parties in order to advise them of alternatives for minimizing the impact of the contamination.

Mr. Eaton has been the primary investigator and author of several reports dealing with the development of groundwater resources for municipal, industrial, and domestic purposes. These studies included the design and analysis of pump-test data to determine the hydrogeologic characteristics of the tested aquifers. Such investigations have been performed in bedrock aquifers and unconsolidated, confined, and unconfined aquifers.

HONORS

Sigma Xi, Research Society of America

MARCUS A. PETERSON

Environmental Scientist

EDUCATION

M.S., water resource management, University of Quebec
B.A., biology, University of New Brunswick

EXPERIENCE

Mr. Peterson's responsibilities at Dynamac Corporation involve feasibility studies dealing with the thermal destruction of hazardous waste. He has participated in site surveys of hazardous waste management practices and incineration facilities at U.S. Navy bases, evaluated current incineration technologies, documented emerging trends in thermal destruction R&D, and defined the regulatory environment for waste co-firing and incineration applications by the U.S. Navy.

Mr. Peterson's past experience includes the direction of a contract to analyze and evaluate U.S. Department of Energy environmental information systems and compliance overview efforts. He developed options and recommendations for improving the environmental and radiological surveillance practiced at DOE nuclear weapons facilities. He also recommended changes to internal DOE orders to support improvements in monitoring and reporting, and data reporting procedures.

Previously, Mr. Peterson was assigned the technical coordination of a U.S. Fish and Wildlife Service contract to prepare a bibliography and eight ecosystem-specific reports dealing with the effects of air pollution and acid rain on fish, wildlife, and habitat. As part of this project, he compiled the bibliography of more than 2,000 references and authored both the introductory volume of the series and reports concerning ecological impacts on grasslands, urban ecosystems, and critical habitats of endangered species.

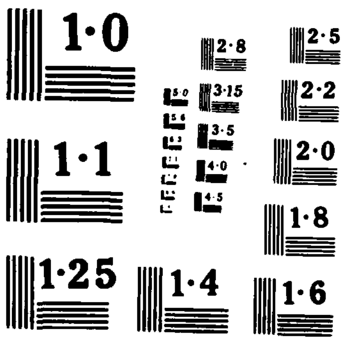
Prior to his employment at Dynamac, Mr. Peterson analyzed Flood Insurance Studies for technical accuracy under a contract with the Federal Insurance Administration. He compiled a bibliography on social impact assessment for the Ministry of Natural Resources of the Government of Quebec, and analyzed various impact assessment methodologies for application to specific water resource de elopment projects. He also performs translations of scientific and technical articles from French to English for water science researchers in Quebec.

PROFESSIONAL AFFILIATIONS

International Association for Impact Assessment

AD-A169 587 INSTALLATION RESTORATION PROGRAM RECORDS SEARCH FOR IDAHO AIR NATIONAL GU..(U) HAZARDOUS MATERIALS TECHNICAL CENTER ROCKVILLE MD FEB 85 DLA900-82-C-4426 2/2

UNCLASSIFIED F/G 13/2 NL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2·5
3·15
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3·5
1·1
2·0
4·0
4·5
1·8
1·25
1·4
1·6

APPENDIX C.

LIST OF INTERVIEWEE IDENTIFICATION NUMBERS

LIST OF INTERVIEWEE IDENTIFICATION NUMBERS

Interviewee Number	Primary Duty Assignment	Years Associated with Gowen Field
1	Aircraft Maintenance	34
2	Administrative Security	36
3	Vehicle Maintenance	31
4	Administrative Sup't.	33
5	Training Site Commander	19
6	Facilities Engineer	14
7	Electronics Supervisor	38
8	Base Civil Engineer	9
9	Base Civil Engineer	29
10	Maintenance Foreman	30
11	Crash Chief	24
12	Chief of Supply	28
13	Fire Chief	11
14	Motor Pool Technician	27
15	Fuels Distribution Supervisor	30
16	Flightline Maintenance Chief	31
17	Electrician/Buildings Sup't.	26
18	Training Site Commander	10
19	Fire Chief	27

APPENDIX D.

USAF HAZARD ASSESSMENT RATING METHODOLOGY

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilites. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilites for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorites for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from the USAF Occupational and Environmental Health Laboratory (OEHL), the Air Force Engineering and Services Center (AFESC), Engineering-Science (ES) and CH_2M Hill.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH_2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, the potential pathways for contamination migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface-water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites at which there is no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ____________________

LOCATION ____________________

DATE OF OPERATION OR OCCURRENCE ____________________

OWNER/OPERATOR ____________________

COMMENTS/DESCRIPTION ____________________

SITE RATED BY ____________________

1. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to installation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	______	______

Receptors subscore (100 X factor score subtotal/maximum score subtotal) ______

11. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ______
2. Confidence level (C - confirmed, S - suspected) ______
3. Hazard rating (H - high, M - medium, L - low) ______

Factor Subscore A (from 20 to 100 based on factor score matrix) ______

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

______ X ______ = ______

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		

Subtotals ______ ______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding		1		

Subscore (100 X factor score/3) ______

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		

Subtotals ______ ______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

______ X ______ = ☐

Table 1
HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels: 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

Table 1--Continued

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level
- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating
- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

Table 1--Continued

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100	8

B-2 Potential for Flooding

Rating Factors	0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Rating Factors	0	1	2	3	Multiplier
Depth to ground water	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to + 20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8

Table 1--Continued

B-3 Potential for Ground-Water Contamination--Continued

Rating Factors	Rating Scale Levels: 0	1	2	3	Multiplier
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casi·gs, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

o Clay cap or other impermeable cover
o Leachate collection system
o Liners in good condition
o Adequate monitoring wells

Surface Impoundments:

o Liners in good condition
o Sound dikes and adequate freeboard
o Adequate monitoring wells

Spills:

o Quick spill cleanup action taken
o Contaminated soil removed
o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

o Concrete surface and berms
o Oil/water separator for pretreatment of runoff
o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

GNR122

APPENDIX E.

SITE RATING FORMS

SITE RATING FORMS

NAME OF SITE Site No. 1 - Current Fire Department Training Area

LOCATION Gowen Field, 200 feet northeast of Building NG 1515

DATE OF OPERATION OR OCCURRENCE 1974 to present

OWNER/OPERATOR Gowen Field Fire Department

COMMENTS/DESCRIPTION Training area jointly used by Boise Air Terminal

SITE RATED BY Hazardous Materials Technical Center

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	93	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 52

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C - confirmed, S - suspected) C
3. Hazard rating (H - high, M - medium, L - low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

100 x 1.0 = 100

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

100 x 1.0 = 100

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
Subtotals			56	108

Subscore (100 X factor score subtotal/maximum score subtotal) 52

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	2 *	1	2	3

Subscore (100 X factor score/3) 67

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	1	8	8	24
Net precipitation	0	6	0	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	3	8	24	24
Subtotals			56	114

Subscore (100 X factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	52
Waste Characteristics	100
Pathways	67

Total 219 divided by 3 = 73
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

73 X 0.95 = 69

*The drainage ditch is reported to flood frequently despite the fact that the flood plain map (Fig. 7) does not show this site to be within the 100 year flood plain.

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 2 - Former Fire Department Training Area

LOCATION Gowen Field, 450 feet east of Building NG 560

DATE OF OPERATION OR OCCURRENCE 1953 to 1974

OWNER/OPERATOR Gowen Field Fire Department

COMMENTS/DESCRIPTION

SITE RATED BY Hazardous Materials Technical Center

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			93	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 52

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

100 x 1.0 = 100

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

100 x 1.0 = 100

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	3	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
Subtotals			56	108

Subscore (100 X factor score subtotal/maximum score subtotal) 52

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	1	8	8	24
Net precipitation	0	6	0	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	3	8	24	24
Subtotals			56	114

Subscore (100 X factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 52

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	52
Waste Characteristics	[illegible]
Pathways	[illegible]
Total 184 divided by 3 =	61
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

61 x 0.95 = [illegible]

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 3 - Central Drainage Ditch

LOCATION Gowen Field, traverses center of base from east to west

DATE OF OPERATION OR OCCURRENCE N/A

OWNER/OPERATOR Gowen Field

COMMENTS/DESCRIPTION

SITE RATED BY Hazardous Materials Technical Center

1. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	93	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 52

11. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C - confirmed, S - suspected) C
3. Hazard rating (H - high, M - medium, L - low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
Subtotals			56	108

Subscore (100 X factor score subtotal/maximum score subtotal) 52

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	2	1	2	3

Subscore (100 X factor score/3) 67

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	1	8	8	24
Net precipitation	0	6	0	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	3	8	24	24
Subtotals			56	114

Subscore (100 X factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	52
Waste Characteristics	48
Pathways	67
Total 167 divided by 3 =	56
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

56 X 1.0 = 56

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 4 - Oil Patch in Drainage Field

LOCATION Gowen Field, 180 feet south of Building T-812

DATE OF OPERATION OR OCCURRENCE Unknown

OWNER/OPERATOR Gowen Field

COMMENTS/DESCRIPTION

SITE RATED BY Hazardous Materials Technical Center

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			90	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 50

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C - confirmed, S - suspected) C
3. Hazard rating (H - high, M - medium, L - low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

50 x 0.8 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
Subtotals			56	108

Subscore (100 X factor score subtotal/maximum score subtotal) 52

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	2	1	2	3

Subscore (100 X factor score/3) 67

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	1	8	8	24
Net precipitation	0	6	0	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	3	8	24	24
Subtotals			56	114

Subscore (100 X factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	50
Waste Characteristics	40
Pathways	67
Total 157 divided by 3 =	52 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

52 X 1.0 = 52

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 5 - Former Fence Post Preserving Operation

LOCATION Gowen Field, 620 feet south-southeast of Building NG 1510

DATE OF OPERATION OR OCCURRENCE Unknown (pre-1980)

OWNER/OPERATOR Gowen Field

COMMENTS/DESCRIPTION Property formerly owned by lumber yard

SITE RATED BY Hazardous Materials Technical Center

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	90	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 50

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C - confirmed, S - suspected) S
3. Hazard rating (H - high, M - medium, L - low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore [illegible]

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	2	8	16	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
Subtotals			48	108

Subscore (100 X factor score subtotal/maximum score subtotal) 44

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	1	8	8	24
Net precipitation	0	6	0	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	3	8	24	24
Subtotals			56	114

Subscore (100 X factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors [illegible]
Waste Characteristics [illegible]
Pathways [illegible]

Total [illegible] divided by 3 = [illegible]
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

46 X [illegible] = [illegible]

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Site No. 6 - Tar Pit

LOCATION Gowen Field, 1200 feet south of Building NG 1510 .

DATE OF OPERATION OR OCCURRENCE 1950 to 1977

OWNER/OPERATOR Gowen Field

COMMENTS/DESCRIPTION Property formerly owned by private asphalt company

SITE RATED BY Hazardous Materials Technical Center

1. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	90	[illegible]

Receptors subscore (100 X factor score subtotal/maximum score subtotal) [illegible]

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) [illegible]
2. Confidence level (C - confirmed, S - suspected) [illegible]
3. Hazard rating (H - high, M - medium, L - low) [illegible]

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

50 x 0.8 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 0.75 = 30

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	2	8	16	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	48	108

Subscore (100 X factor score subtotal/maximum score subtotal) 44

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
2. Flooding	0	1	0	3

Subscore (100 X factor score/3) 0

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	1	8	8	24
Net precipitation	0	6	0	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	3	8	24	24
		Subtotals	56	114

Subscore (100 X factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	[illegible]
Waste Characteristics	[illegible]
Pathways	49
Total 129 divided by 3 =	43
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

43 X 1.0 = 43

APPENDIX F.

INVENTORY OF POL STORAGE TANKS

INVENTORY OF POL STORAGE TANKS

FUEL	LOCATION	TANK CAPACITY (gal)	NUMBER, TYPE OF TANKS
JP-4	POL Area	420,000	1-Aboveground
JP-4	POL Area	25,000	1-Aboveground
JP-4	Bldg 1515	5,000	1-Aboveground
AVGAS	POL Area	30,000	1-Aboveground
MOGAS	Bldg 507	6,000	1-Underground
Diesel Fuel	Bldg 152	1,000	1-Underground
Fuel Oil	Bldg 148	6,000	1-Underground
Fuel Oil	Bldg 151	275	1-Aboveground
Fuel Oil	Bldgs 201&202	3,000	1-Underground
Fuel Oil	Bldgs 204&205	3,000	1-Underground
Fuel Oil	Bldgs 210&211	3,000	1-Underground
Fuel Oil	Bldgs 212&213	3,000	1-Underground
Fuel Oil	Bldgs 214&219	3,000	1-Underground
Fuel Oil	Bldgs 216&217	3,000	1-Underground
Fuel Oil	Bldg 222	3,000	1-Underground
Fuel Oil	Bldg 225	3,000	1-Underground
Fuel Oil	Bldg 227	285	1-Aboveground
Fuel Oil	Bldgs 232&233	3,000	1-Underground
Fuel Oil	Bldg 235	3,000	1-Underground
Fuel Oil	Bldgs 247& 248	3,000	1-Underground
Fuel Oil	Bldg 249	285	1-Aboveground
Fuel Oil	Bldg 250	285	1-Aboveground
Fuel Oil	Bldg 252	2,000	1-Underground
Fuel Oil	Bldg 253	2,000	1-Underground
Fuel Oil	Bldg 301	275	2-Aboveground
Fuel Oil	Bldg 302	3,000	1-Underground
Fuel Oil	Bldg 303	275	1-Aboveground
Fuel Oil	Bldg 307	2,000	1-Underground (not used)
Fuel Oil	Bldg 309	275	1-Aboveground
Fuel Oil	Bldgs 401&404	3,000	1-Underground
Fuel Oil	Bldg 407	285	1-Aboveground
Fuel Oil	Bldg 408	285	1-Aboveground
Fuel Oil	Bldg 409	285	1-Aboveground
Fuel Oil	Bldg 410	285	1-Aboveground
Fuel Oil	Bldg 443	285	1-Aboveground
Fuel Oil	Bldg 444	285	1-Aboveground
Fuel Oil	Bldg 502	285	1-Aboveground
Fuel Oil	Bldg 503	3,000	1-Underground
Fuel Oil	Bldg 504	2,000	1-Underground
Fuel Oil	Bldg 513	1,000	1-Underground

FUEL	LOCATION	TANK CAPACITY (Gal)	NUMBER, TYPE OF TANKS
Fuel Oil	Bldg 515	3,000	1-Underground
Fuel Oil	Bldg 518	2,000	1-Underground (not used)
Fuel Oil	Bldg 521	285	1-Aboveground
Fuel Oil	Bldg 521	1,000	1-Underground
Fuel Oil	Bldg 521	3,000	1-Underground
Fuel Oil	Bldg 530	3,000	1-Underground
Fuel Oil	Bldg 536	285	1-Aboveground
Fuel Oil	Bldg 550	36,000	1-Underground
Fuel Oil	Bldg 551	4,000	1-Underground
Fuel Oil	Bldg 552	285	1-Aboveground
Fuel Oil	Bldg 554	285	1-Aboveground
Fuel Oil	Bldg 559	1,000	1-Underground
Fuel Oil	Bldg 666	5,000	1-Underground
Fuel Oil	Bldgs 701,703,714	3,000	1-Underground
Fuel Oil	Bldg 706	3,000	1-Underground
Fuel Oil	Bldgs 707&708	3,000	1-Underground
Fuel Oil	Bldg 709	285	1-Aboveground
Fuel Oil	Bldgs 711&713	3,000	1-Underground
Fuel Oil	Bldg 718	285	1-Aboveground
Fuel Oil	Bldg 903	500	1-Underground
Fuel Oil	Bldgs 904&905	1,000	1-Underground
Fuel Oil	Bldg 908	500	1-Underground
Fuel Oil	Bldgs 909&910	1,000	1-Underground
Fuel Oil	Bldg 913	500	1-Underground
Fuel Oil	Bldgs 914&915	1,000	1-Underground
Fuel Oil	Bldgs 917&918	1,000	1-Underground
Fuel Oil	Bldgs 919&920	1,000	1-Underground
Fuel Oil	Bldg 926	500	1-Underground
Fuel Oil	Bldg 1510	1,000	1-Underground
Fuel Oil	Bldg 1517	500	1-Underground
Waste Oil	Fire Pit	9,600	1-Underground

APPENDIX G.

INVENTORY OF OIL/WATER SEPARATORS

INVENTORY OF OIL/WATER SEPARATORS

Bldg No.	Facility Identification	Wastes Collected	Water Dischargea
152	Corrosion Control Shop	Sand/Grease	Sanitary Sewer
153/154	Tire Shop	Oil	Sanitary Sewer
506	DEH	Sand/Grease	Drainage Ditch
551	Transportation Motor Pool	Sand/Grease Sand/Grease	Sanitary Sewer Sanitary Sewer
555	OMS	Sand/Grease	Sanitary Sewer
556	Base Storage	Sand/Grease	Sanitary Sewer
557	MATES(Tank Wash Rack)	Sand/Grease	Drainage Ditch
561	CSMS	Sand/Grease	Sanitary Sewer
562	Base Storage	Drainage	Sanitary Sewer
1512	Propulsion Shop	Sand/Grease	Sanitary Sewer
1518	Corrosion Control Hangar	Oil	Sanitary Sewer

a Oil/solvent fractions are disposed of through DPDO or removed by a commercial contractor.

APPENDIX H.

DETAILED LISTING OF BASE OPERATIONS

DETAILED LISTING OF BASE OPERATIONS

Operation/Shop Name	Building Number	Handles Hazardous Materials	Generates Hazardous Waste	Current Waste Management Method
Avionics Shop	155	x	x	Fire Training/ Landfill
Pneudraulic Shop	148	x	x	DPDO
Battery/Instrument Shop	148	x	x	Landfill
Tire Shop	153	x	x	DPDO
Propulsion Shop	1512	x	x	DPDO/OWS
Corrosion Control Shop	152/1518	x	x	DPDO/Landfill
NDI Laboratory	1509	x	x	DPDO/Sanitary Sewer
Support Equipment Shop	154	x	x	DPDO/OWS/Sanitary Sewer
Engine Test Cell	1515	x	x	
Helicopter Maintenance	559	x	x	Landfill/Contractor
Fuels Management (POL)	560-5601 5603	x	x	Fire Training
Fuel Oil Storage	550	x		
Vehicle Filling Stations	507/516/558	x		
Fuel Cell Maintenance	1519	x	x	Fire Training/OWS/ Landfill
LOX Storage	127	x		
Munitions Storage	1510/1523-1524 1114-1124	x		
Supply	203/207/208 228/229	x		
Fire Station	147	x		
Dispensary	446/668	x		
Motor Pool	506/515/551	x	x	DPDO/OWS/ Contractor
Tracked Vehicle Maintenance	555/557/558 561/924	x	x	Contractor/OWS Sanitary Sewer
Civil Engineering	503/504	x	x	Contractor
Hazardous Materials Accumulation Points	511/517/520 556/5622/563 1522	x		

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